FINAL REPORT
SCHNITZER STEEL WHARF SEDIMENT CAP CONSTRUCTION OBSERVATIONS AND ACCEPTANCE

Prepared for

Schnitzer Steel Products Company
12005 North Burgard Street
Portland, OR 97203

By

BERGER/ABAM Engineers Inc.

March 2, 1999

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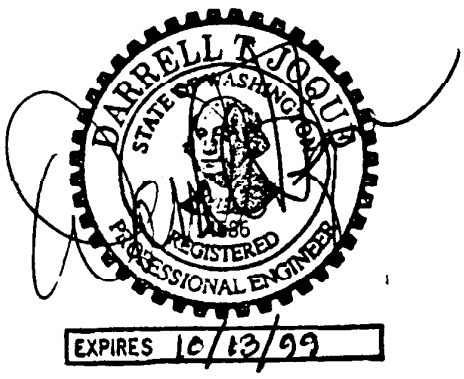


Darrell T. Joque
Project Manager

Frank L. Yang
Project Engineer

Chris Barnes
Inspector

TABLE OF CONTENTS

BERGER/ABAM ENGINEERS INC.
33301 Ninth Avenue South
Federal Way, WA 98003-6395
206/431-2300 • FAX 206/431-2250

BERGER/ABAM
ENGINEERS INC.

PLANNING
ENGINEERING
ENVIRONMENTAL
PROGRAM MANAGEMENT

3 March 1999

Mr. Timothy R. Todd
Environmental Administrator
Schnitzer Steel Products Company
12005 North Burgard Street
Portland, OR 97203

Re: Engineering Services for Monitoring Placement of Slope Remediation at Hylebos Waterway, Letter of Agreement Dated 22 October 1998

Subject: Transmittal of Final Report - Schnitzer Steel Wharf Sediment Cap, Construction Observations, and Acceptance

Dear Mr. Todd:

Enclosed are four copies of the final report documenting the construction and acceptance of the sediment cap at your Tacoma, Washington facility. This report fulfills the requirement of the approved work plan for the sediment cap at the Schnitzer Steel Wharf and completes our work under the above letter of agreement.

Should you have any questions regarding the report or our work on the sediment cap, please call me at 206/431-2305. Thank you for this opportunity to be of service.

Sincerely,

Darrell T. Joque, PE, SE
Project Manager

DTJ:kjr
Attachments

cc w/encl.: Dennis Griffith, Schnitzer Steel

~ 780 ft by bulkhead
110 ft
area covered
~ 600 - 800 tons
~ 100 - 150 tons
concrete

FINAL REPORT
SCHNITZER STEEL WHARF SEDIMENT CAP
CONSTRUCTION OBSERVATIONS AND ACCEPTANCE

AUTHORIZATION

The work was accomplished in general accordance with the scope of work included in the Letter of Agreement between BERGER/ABAM Engineers Inc. and Schnitzer Steel Products Company, titled, "Engineering Services for Monitoring Placement of Slope Remediation at Hylebos Waterway," dated 6 October 1998.

INTRODUCTION

Schnitzer Steel Industries (SSI), formerly known as General Metals of Tacoma, operates a 26-acre scrap metal recycling facility with 1,000 feet of frontage on the Hylebos Waterway. In December 1995, an approximate 100-foot portion of the facility's bulkhead failed, requiring emergency repair measures. Additional sections of the steel wharf collapsed in 1996 and 1997. In 1997, SSI decided to replace the existing 525-foot steel wharf, scrap metal deflector, and two floating crane ship docks with a new 400-foot concrete wharf, a new steel sheet bulkhead, a new concrete dolphin, and a traveling crane with a 200-ton capacity.

As part of this bulkhead replacement and wharf construction project, SSI has entered into an Administrative Order on Consent for a Removal Action for the General Metals Sediment Site, dated 5 October 5 1998. This Order requires SSI to conduct a remedial action for contaminated intertidal and shallow subtidal sediments located on the Hylebos Waterway side of the existing bulkhead.

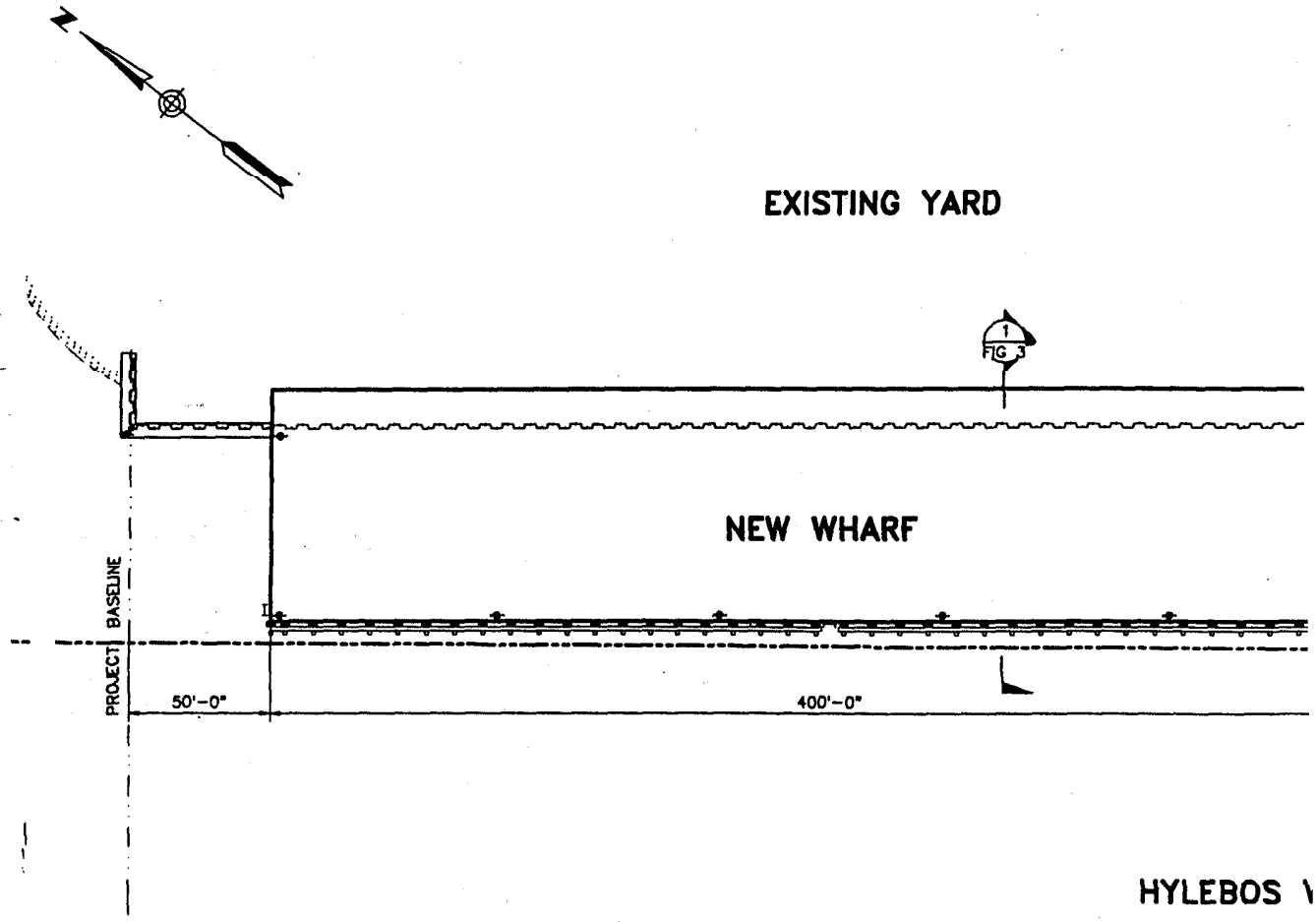
The appropriate remedial action is to cap the contaminated sediments to physically isolate benthic organisms from contamination. The cap also prevents physical erosion of contaminated sediments. The cap design is specified in the approved work plan prepared by the Bridgewater Group Inc. and dated 6 October 1998.

General Construction (GC) is the prime contractor for the Schnitzer Steel sediment cap remediation project. Their responsibilities included complete construction of the sediment cap. BERGER/ABAM prepared the cap design and provided construction support in engineering and field inspection. They performed all lead line surveys. Global Diving and Salvage was employed by Schnitzer Steel to perform underwater inspections.

This report documents observations and measurements made during construction of the cap and is the acceptance of the cap by BERGER/ABAM.

SEDIMENT CAP CONFIGURATION

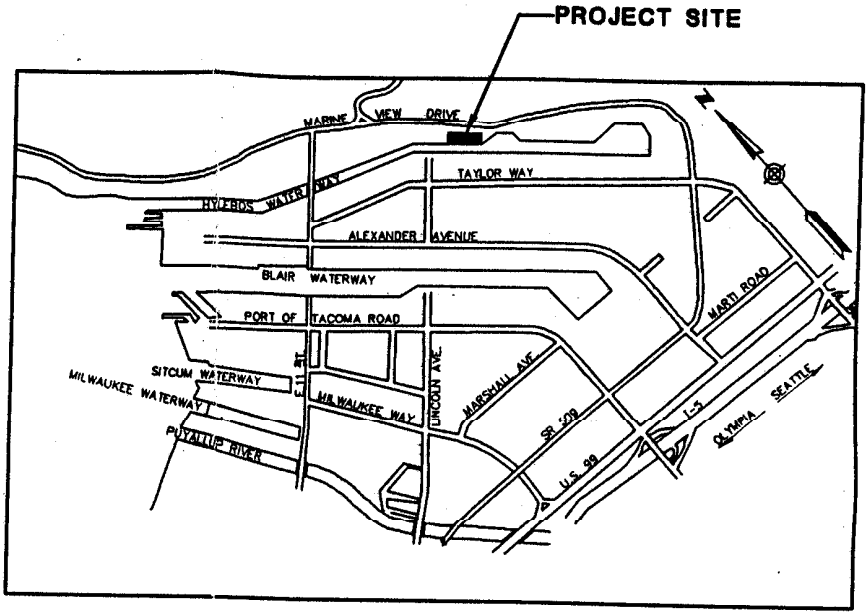
Figure 1 shows a plan of the SSI site with the location of the new pier. Figure 2 is a plan showing the extent of the sediment cap. Figure 3 is a section through the wharf area showing the design cross section of the cap.



HYLEBOS \

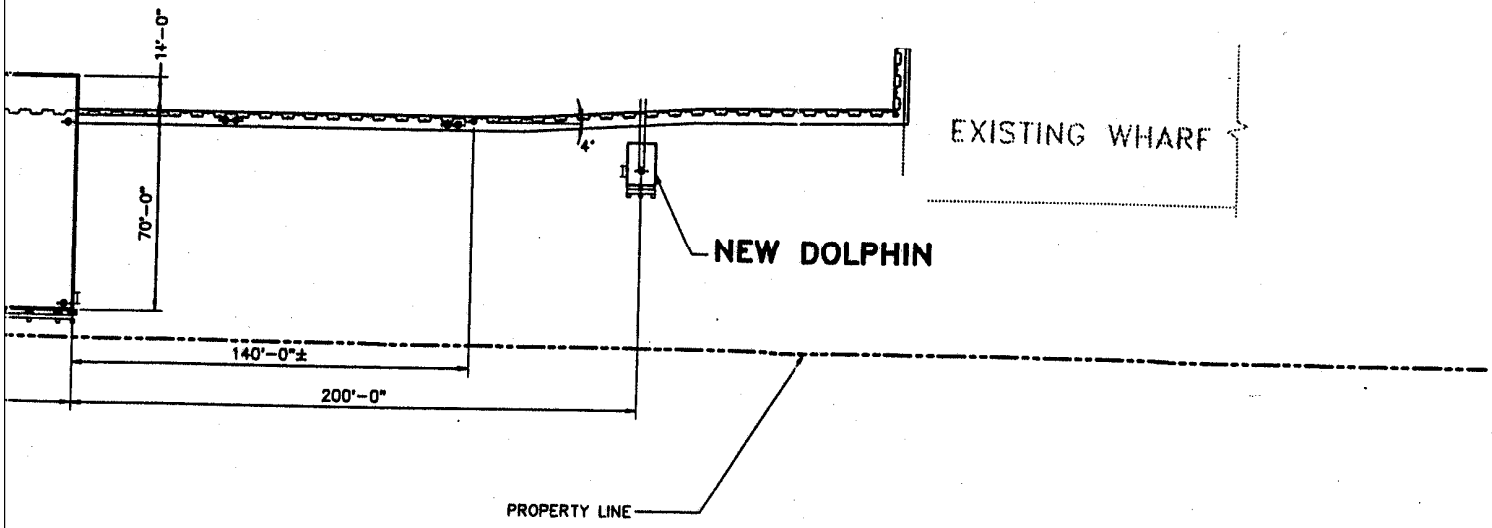
FIGURE 1 - SITE P

SCALE: 1"=60'-0"



VICINITY MAP

SCALE: NONE



ATERWAY

1"=60' 60 0 60 120 scale feet

AN

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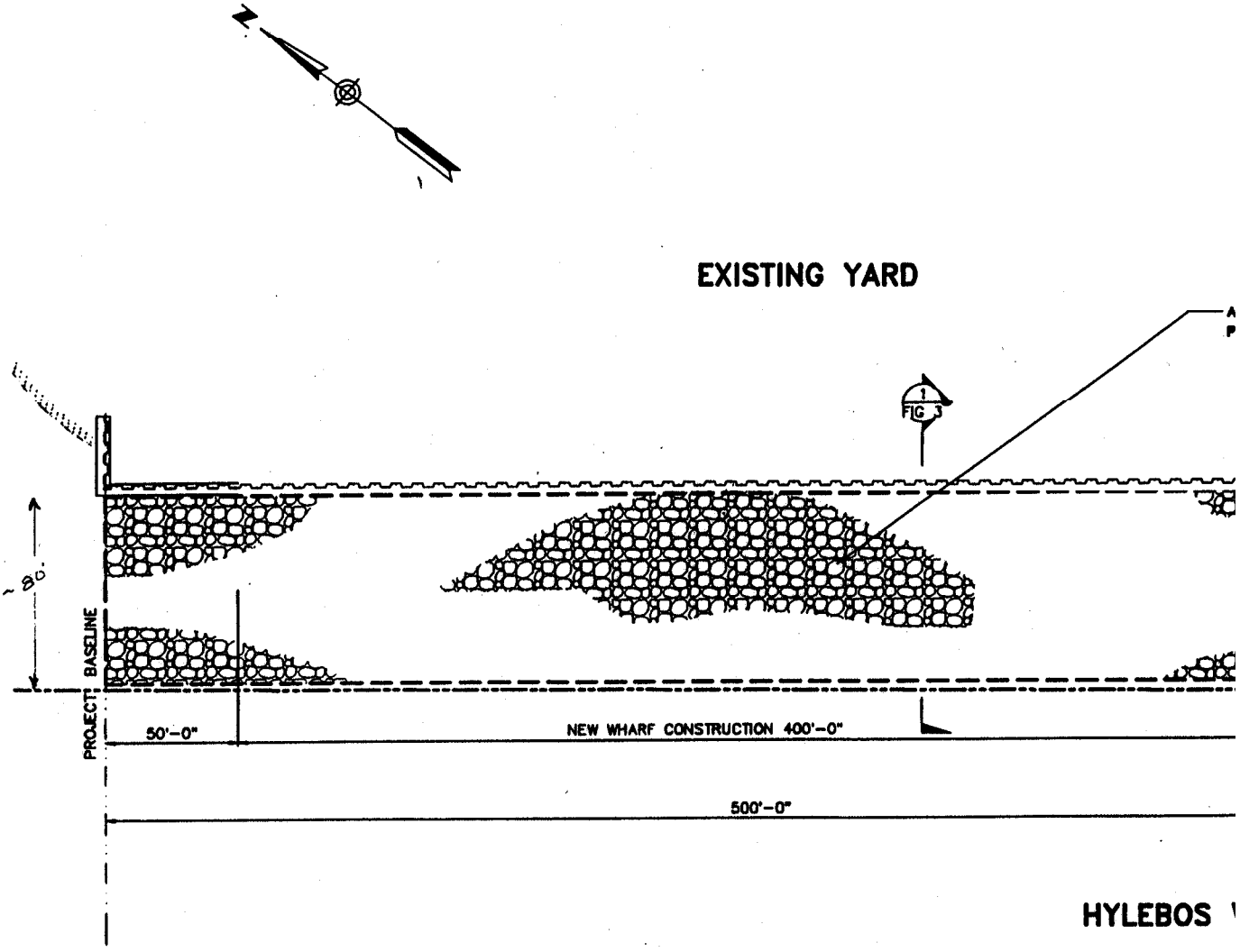
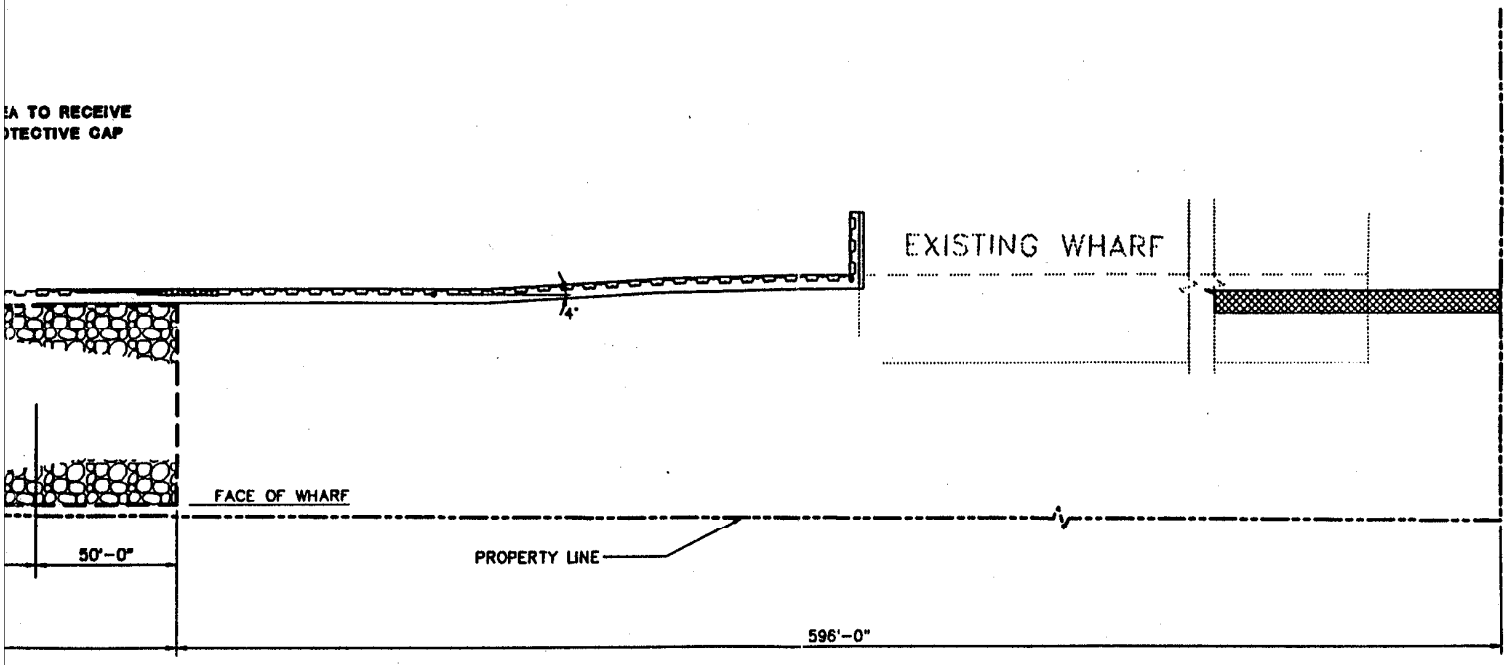


FIGURE 2 - PROT

SCALE: 1"=60'-0"

\2CAP.dwg SCALE: 360

A TO RECEIVE
TECTIVE CAP



ATERWAY

CTIVE CAP AREA

1"=60' 60 0 60 120 scale feet

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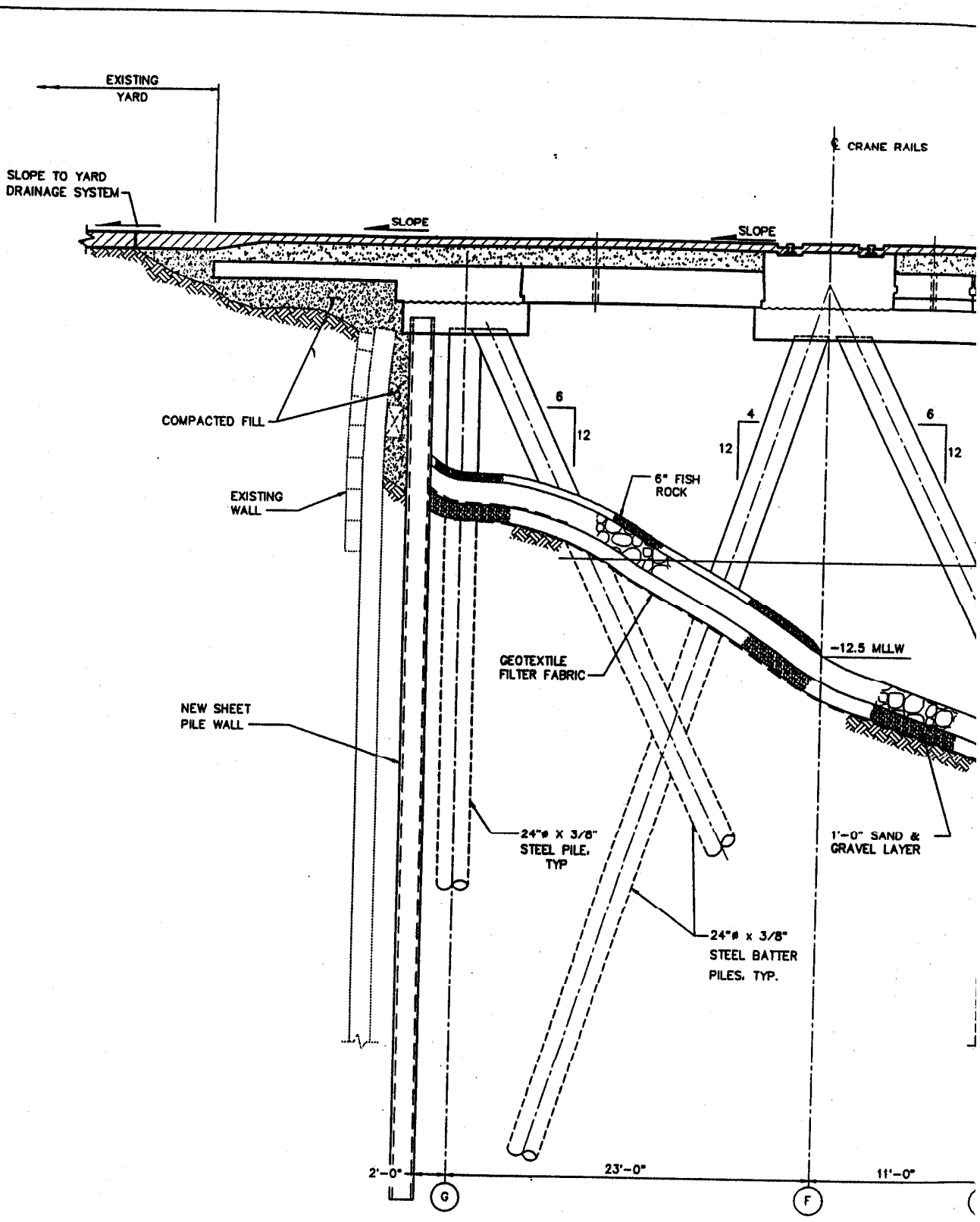
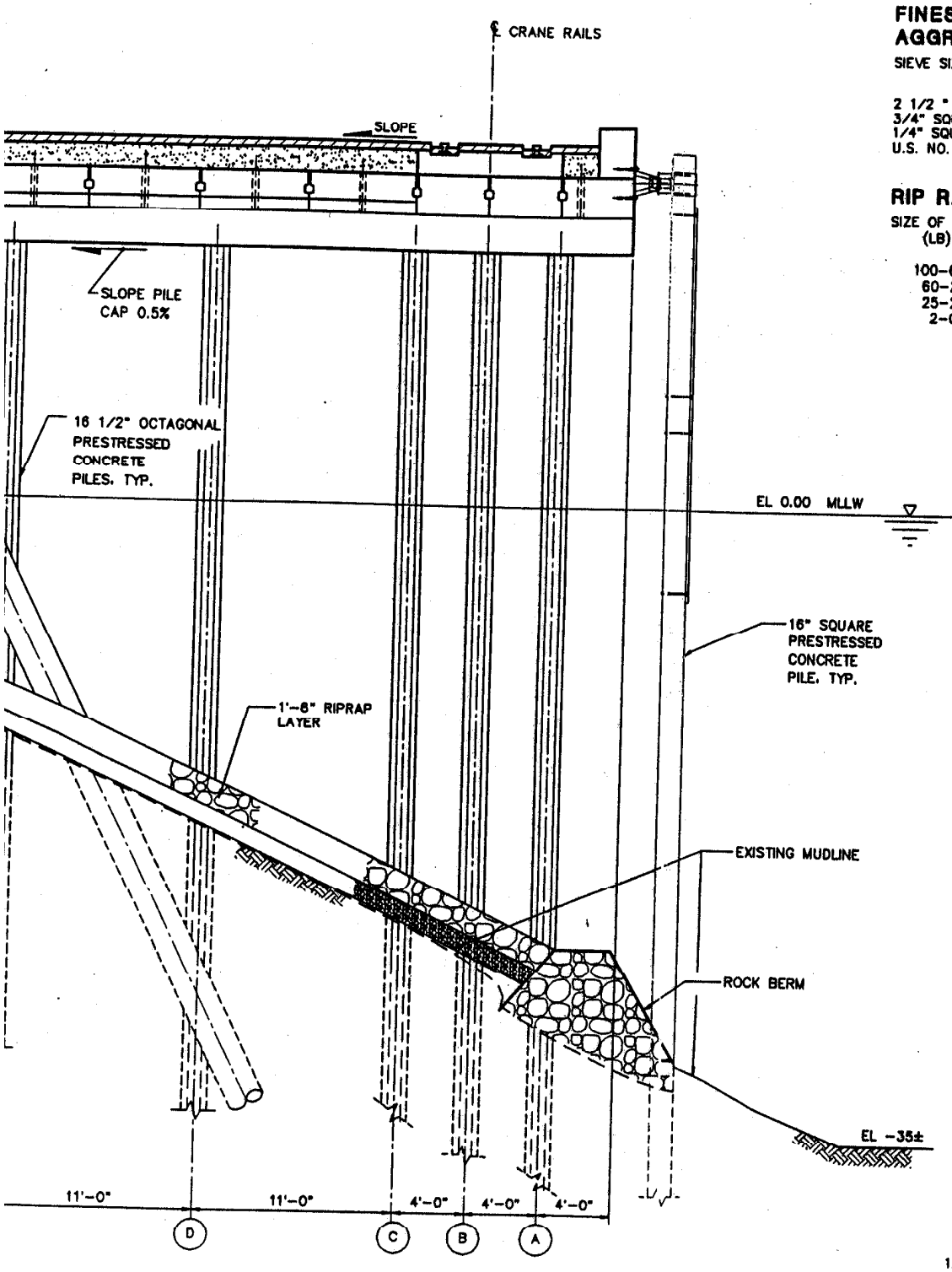


FIGURE 3 - WHARF A
SCALE: 1/8" = 1'-0"

PLOTTED: Tue Sep 29 1998 9:45am FILENAME: K:\1995\VA950025\Fig4.dwg SCALE: 48



FINES AND COARSE AGGREGATES (1400 cy)

SIEVE SIZE	PERCENT PASSING (BY WEIGHT)
2 1/2 " SQUARE	100
3/4" SQUARE	40-80
1/4" SQUARE	5 MAX
U.S. NO. 100	0-2

RIP RAP (2810 cy)

SIZE OF ROCK (LB)	PERCENT (BY WEIGHT)
100-60	20.0
60-25	30.0
25-2	40.0
2-0	10.0

1. THE BASIS FOR ELEVATIONS SHOWN ARE ON THE CITY OF TACOMA JULY 1990 NGVD BENCH MARK. AT POWER POLE NO. 181006 ELEV 10.654 (MSL) LOCATED ON THE NORTHERLY RIGHT-OF-WAY OF MARINE VIEW DRIVE.

2. THE ELEVATIONS SHOWN ON THIS DRAWING ARE ON MEAN LOWER LOW WATER (MLLW) DATUM WHICH IS 6.32 FEET LOWER THAN MEAN SEA LEVEL (MSL) DATUM

1/8"=1' scale 5 0 5 10 15 20 feet

) CAP CROSS SECTION

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PRECONSTRUCTION SURVEY

A preconstruction survey was performed by BERGER/ABAM after the cap area was cleaned of debris and the geotextile fabric laid. The preconstruction survey establishes the existing ground line for verification of as-placed cap thickness. Measurements are established on a grid of 25 feet along the length of the sheet pile bulkhead and 10 feet perpendicular to the bulkhead. The same grid is used for all subsequent measurements.

Before construction of the sediment cap began, 20 stations 25 feet apart were established along the sheet pile bulkhead by survey and were tied to the wharf grid lines. Stations were marked and metal hooks welded to the sheet pile to establish reference points. Station 20 was deleted before the post-cap survey was started. At the south end of the cap, material thickness was tapered from the full cross section to the existing bottom to maintain stability of the cap. This station was not needed, because it is in the taper area.

Measurements are taken at 10-foot intervals from the bulkhead to 6 feet beyond the rock berm. The intervals were established using a skiff with a spooled cable mounted on the bow and marked in 10-foot increments. The cable is attached to the hook at each station and kept taut by the skiff operator while measurements are taken. Photos 5 and 6 in Appendix A show the survey operation.

Depth at each location is determined using a fiberglass reel tape with a weight tied to the end. Corresponding elevations were established using tide boards at each end of the site. The first three stations are measured twice to establish repeatability. Survey data is in Appendix F.

CONSTRUCTION OBSERVATIONS

The sediment cap construction was observed by Frank Yang, project engineer, and Chris Barnes, inspector; both of BERGER/ABAM.

Construction Sequence

Prior to cap construction, the entire cap area was cleaned of scrap and debris. The cap was then constructed in two stages. The first half, from Station 1 to Station 10, was placed in the following sequence.

The geotextile fabric was laid down on the cleaned slope. Then the toe berm was placed first to stabilize the existing slope. The gravel layer was placed from bottom to top to the required thickness. Next, the riprap was placed from bottom to top to the required thickness. Finally, the fishrock was placed on the upper slope next to the bulkhead.

This sequence was then repeated from Station 10 to Station 19 to complete the cap. Photographs of the various operations are included in Appendix A.

Clearing Scrap and Debris

Scrap and debris were cleaned by SSI prior to cap construction operations to minimize obstructions to pile driving and to eliminate tearing hazards to the geotextile fabric that

forms the foundation for the cap. Global divers performed a reconnaissance survey to locate the debris and to plan cleanup operations. After a cleanup pass was made, the divers repeated their visual assessment of the slope to identify remaining scrap. Several passes were made by the cleanup crews before the slope was free of debris. Adequate removal was verified by divers prior to placement of the geotextile fabric.

Geotextile Fabric Placement

Geotextile fabric, Amoco Petromat 4545, was supplied in 300-foot long rolls, 15 feet wide. The fabric was fastened to the bulkhead and unrolled down the slope by divers in a single length all the way to the toe of the slope.

Adjacent strips of fabric were overlapped by a minimum of 2 feet. The fabric was secured to the bottom by sandbags. Photos 1 through 4, in Appendix A, show the topside operations during fabric placement.

Rock Berm Construction

A berm was placed at the toe of the slope to stabilize the cap. It was constructed of riprap consisting of quarry spalls and was placed using a derrick and skip box. The box was filled and lowered to the bottom. It was then raised slightly and opened to release the riprap in a controlled manner.

The design thickness of the berm is 5 feet at its maximum. The design configuration in Figure 3 shows a 3-foot-wide flat top surface with front and back of the berm at an approximately 1:1 slope. In practice, it is not possible to place riprap with precision sufficient enough to maintain this geometry. The contractor put enough material into the toe berm to provide the 5-foot peak thickness over the entire berm width. This ensures placement of more material than is actually needed to stabilize the cap. Figure 4 shows a typical as-placed cross section with the theoretical rock berm superimposed.

Thickness of the berm was verified by leadline measurement before moving on to the next station. Material tickets are in Appendix E. Volume calculations for the rock berm are included in Appendix G. Photos 9 and 10, in Appendix A, show the material and placement method.

Sand and Gravel Placement

Fine and coarse aggregate material (sand and gravel) was placed a minimum of 1-foot thick over the geotextile fabric. Sand and gravel was obtained from the Dupont facility of Lone Star Northwest, Inc., a Washington State Department of Transportation (WSDOT)-approved source. This material was visually inspected and met the work plan requirements of clean, well-graded rock with an average diameter less than 2-1/2 inches. Photos 11 through 14, in Appendix A. show the material and placement method used.

Elevation measurements were not taken on this layer of cap. However, the volume of the 74-foot-wide by 500-foot-long sand and gravel layer is 37,000 cubic feet. For a relatively loosely placed material, the submerged unit weight would be approximately 75 pounds per cubic foot. The material needed to fill the design layer would thus be 1,400 tons +/-. The

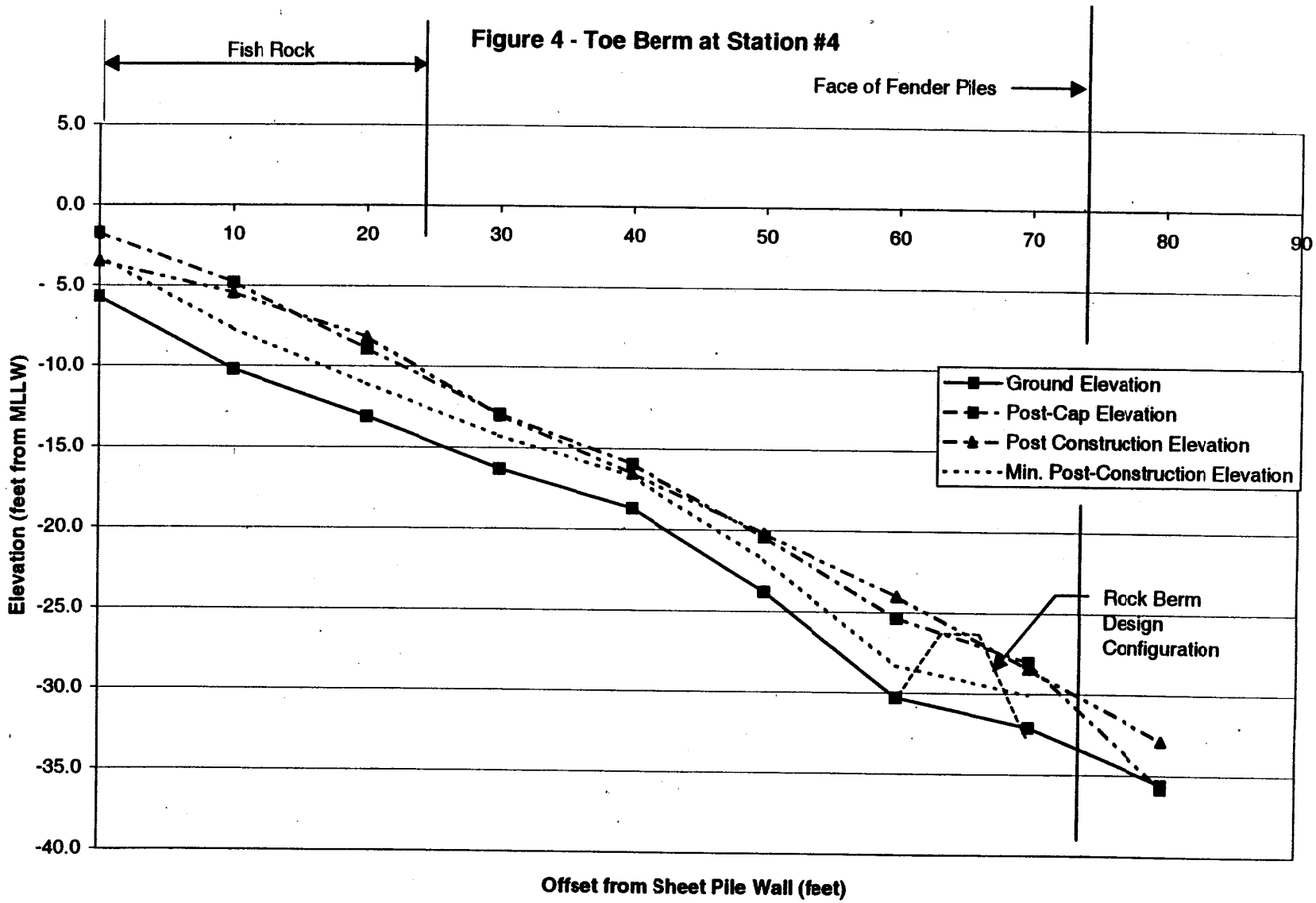


Figure 4 - Toe Berm at Station #4
Fish Rock
Face of Fender Piles
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset from Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm
Design
Configuration

amount of sand and gravel actually delivered and placed is 3,000 tons. Material delivery tickets are in Appendix E.

Riprap Placement

A 1-1/2- foot plus thickness of riprap was placed over the sand and gravel layer. Riprap was obtained from the Mats Mats Quarry and Steilacoom Plant of Lone Star Northwest, Inc., both WSDOT approved sources. This material was visually inspected and met the work plan requirements for clean durable crushed rock that was consistent in size and meeting gradation requirements. Photos 17 and 20 showing material and placement are in Appendix A. Material delivery tickets are in Appendix E. Volume calculations comparing total cap volume to the design volume are in Appendix G.

Fish Rock Placement

The as-built bottom elevation at the bulkhead is -3.5 feet instead of the plan +3.0; therefore, the elevation to which the fish rock extends was changed to -12.5 feet to maintain the required area of 6-inch-thick habitat. Fish rock was obtained from the Dupont, Washington facility of Lone Star Northwest, Inc., a WSDOT approved source. The fish rock was visually inspected and met plan specifications, consisting of well-graded -5/8-inch material. Photos 21 through 24 showing material and placement are in Appendix A.

The volume of the 30-foot-wide by 500-foot-long fish rock layer is 7,500 cubic feet. For a relatively densely placed material, the submerged unit weight would be approximately 90 pounds per cubic feet. The material needed to fill the design layer would therefore be 340 tons +/-. The amount of fish rock actually delivered and placed is 2,476 tons; thereby, ensuring that all of the voids in the riprap have been filled and the entire designated area of habitat coverage has more than the design thickness. Material delivery tickets are in Appendix E.

Divers Reports

Diving reports are not available at this time. When they become available, copies will be sent under separate cover.

POST-CAPPING SURVEY

After construction of the cap was completed, but before any piles were driven, BERGER/ABAM conducted a post-capping survey to verify that the as-placed sediment cap thickness is equal to or greater than the required minimum. Measurements showed adequate material coverage over the entire cap area. Methods used for the post-capping survey are the same as for the preconstruction survey. Data is in Appendix F.

POST-CONSTRUCTION SURVEY

After all concrete and steel piles have been driven, BERGER/ABAM conducted a post-construction survey to determine if settlement from pile driving reduced final cap thickness to less than the minimum or if it produced areas of potential slope instability. The data was

plotted as cross sections at each station. These showed that some settlement had occurred in isolated areas leaving low spots. The resulting slopes are not steep enough to indicate instability.

The areas where these depressions reduced cap thickness below the minimum were located and the information given to the contractor. Additional riprap was placed in these locations to bring the cap up to required thickness. Methods used for conducting the post-construction survey are the same as used in preconstruction survey. Data and cross sections for this survey can be found in Appendix F.

Volume calculations were performed to compare the measured prism, the entire cap thickness, at each station with the design volume. The measured volume over the entire length of cap is approximately 2.6 times the design volume. This is consistent with the amount of material delivered and placed. The calculated as-placed volume does not include an assumed 6-inch settlement of the existing slope due to the weight of the cap materials. The calculations are in Appendix G.

CONFORMANCE TO DESIGN INTENT

Isolation of Contaminated Sediments

The entire cap acts as an integrated seal to provide the required isolation. The philosophy applied to the construction process was to provide much more than the minimum thickness to make sure that the entire area meets or exceeds the design thickness.

The geotextile fabric is not intended to provide a membrane seal. Its function is to prevent migration of the underlying sediments into the sand and gravel layer. To this end, the existing slope was cleared of debris prior to Geotextile fabric placement to prevent punctures.

The rock berm at the toe of the cap provides stability to the entire cap structure, which rests on the existing slope. The volume of material placed is more than the design configuration calls for.

The sand and gravel layer provides the seal, holding the geotextile in place and capping the underlying sediments. Much more material was placed in this layer than called for in the design in order to ensure adequate coverage of the entire cap area despite the vagaries of placing granular material underwater.

The riprap layer provides protection to the sand and gravel seal from disturbance by wave and wake action and from prop wash from berthing ships. Like the other cap components, this layer was also placed with much more material than the minimum design thickness requires. The effectiveness of this approach can be seen in the cross sections plotted from the survey data. Several of the stations are at minimum design thickness where placement variations combine with settlement due to pile driving.

Survey measurements show that the entire cap exceeds the required thickness, and that the areas of minimum thickness equal the design value.

Slope Stability

Slope stability was evaluated using precapping, post-capping, and post-construction survey data. Figure 5 shows a typical cross section with 2:1 and 1-1/2:1 slopes indicated. In general, all slopes, both existing and final, are 2:1 or less. There are localized areas where the existing slope was 1-1/2:1 or slightly higher. Figure 6 shows the worst case. However, the stabilizing effect of the riprap layer, which is at a 2:1 or shallower slope over the entire cap area, will prevent instability.

The design of the cap slope protection is based on *Guidelines for the Design of Armored Slopes Under Open Piled Quay Walls*, 1997, which is published by the Permanent Association of Navigation Congresses. The Guidelines call for riprap slopes of 1-1/2:1 for typical designs, but note that slopes as steep as 1-1/4:1, which is the practical limit, have been used successfully.

There was some minor sloughing due to pile driving. The resulting low spots were filled with riprap so the final slope is relatively uniform and stable. Cross sections plotted from survey data and showing initial, post-capping, and final ground surface are in Appendix F.

Fish Habitat

Fish rock was placed on top of the Riprap from the bulkhead to -12.5 feet in elevation to fill the voids. The amount of material placed on the designated area was much more than the volume of the 6-inch-thick design layer. This filled the large voids in the riprap layer and ensured a gravel surface that is suitable for fish habitat.

Future Dredging Capability

Placement of the toe berm with excess material allows for future maintenance dredging of the dock area to elevation –40 feet. Figure 7 shows the effect of future dredging on a typical as-placed cross section.

CONCLUSIONS

It has been concluded from careful observation of construction practices and measurements of the cap at various stages of construction that the sediment cap meets the intent of the design and will function as planned. This report and its appendices document the basis for the acceptance of the cap construction.

Calculations were made to verify that the expected plan volumes for sediment cap material were met. These calculations, in Appendix G, show that more material was used compared to the design volumes. This is consistent with the construction philosophy of providing more material than required by design to compensate for uncertainties in placement and the effects of subsequent construction on the cap.

Sediment cap acceptance was indicated by letter from BERGER/ABAM to General Construction Company dated 7 January 1999. A copy of the letter is in Appendix B.

Figure 5 - Station #14, Typical Slopes

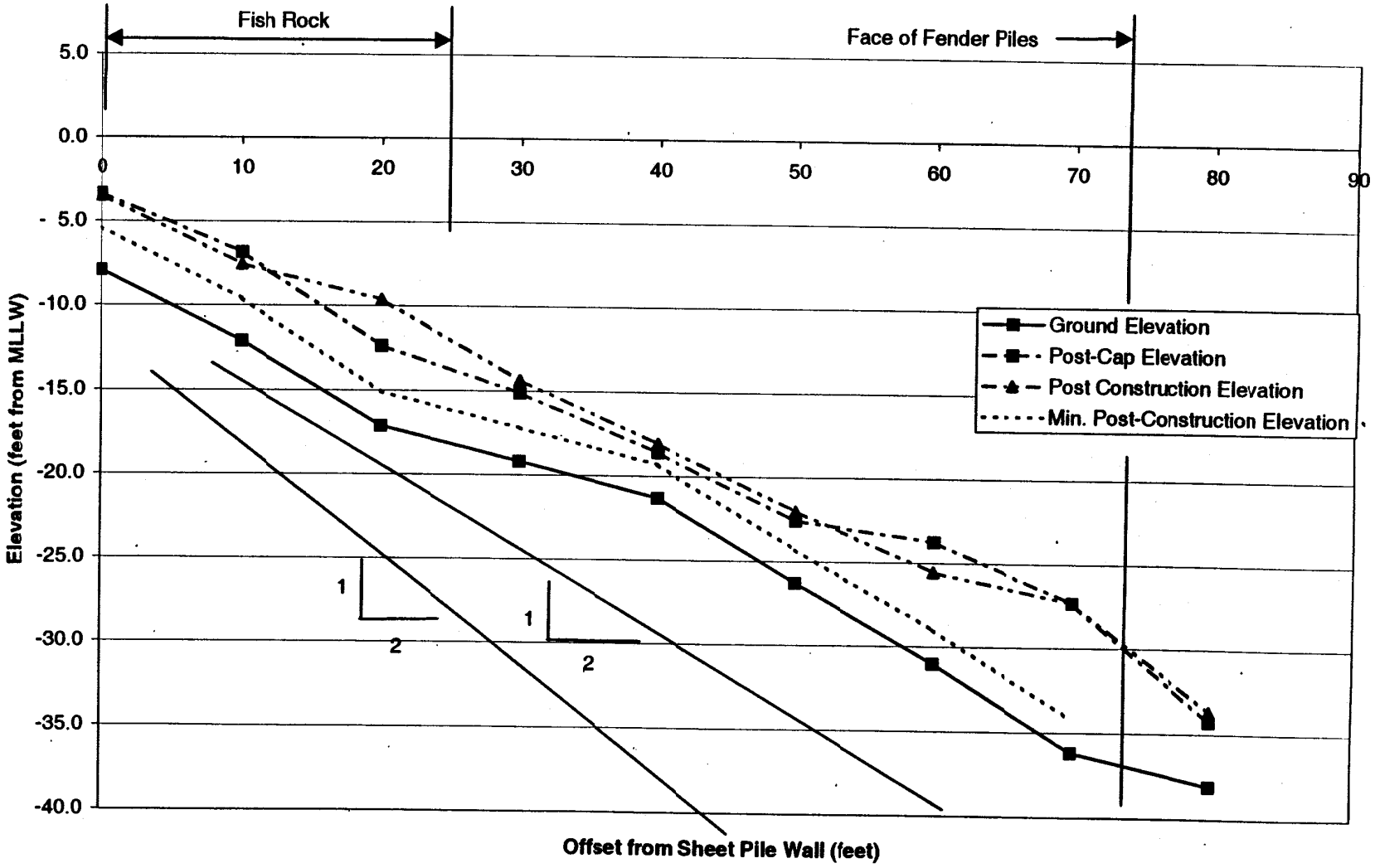


Figure 6 - Station #2, Steepest Exist Slope

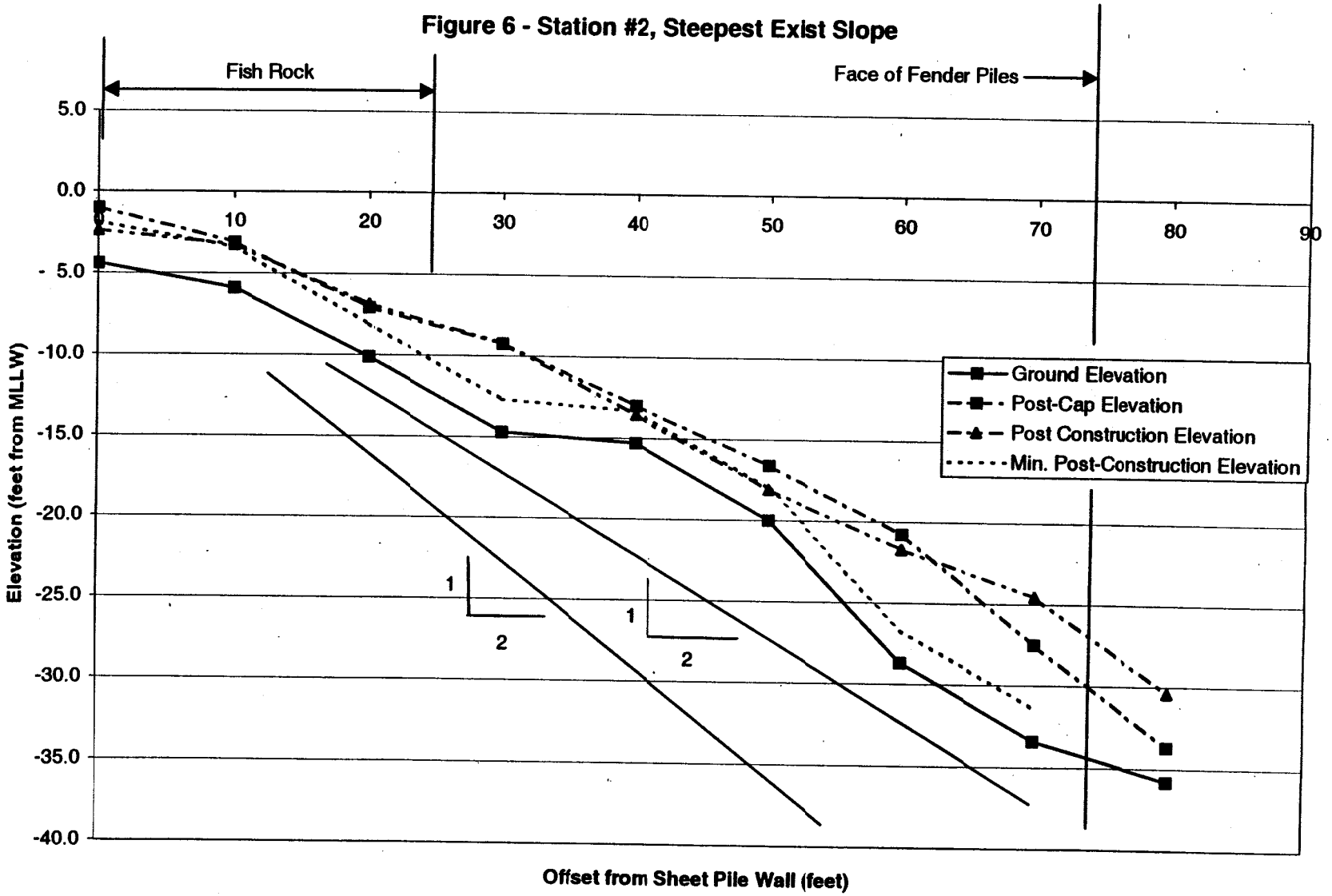
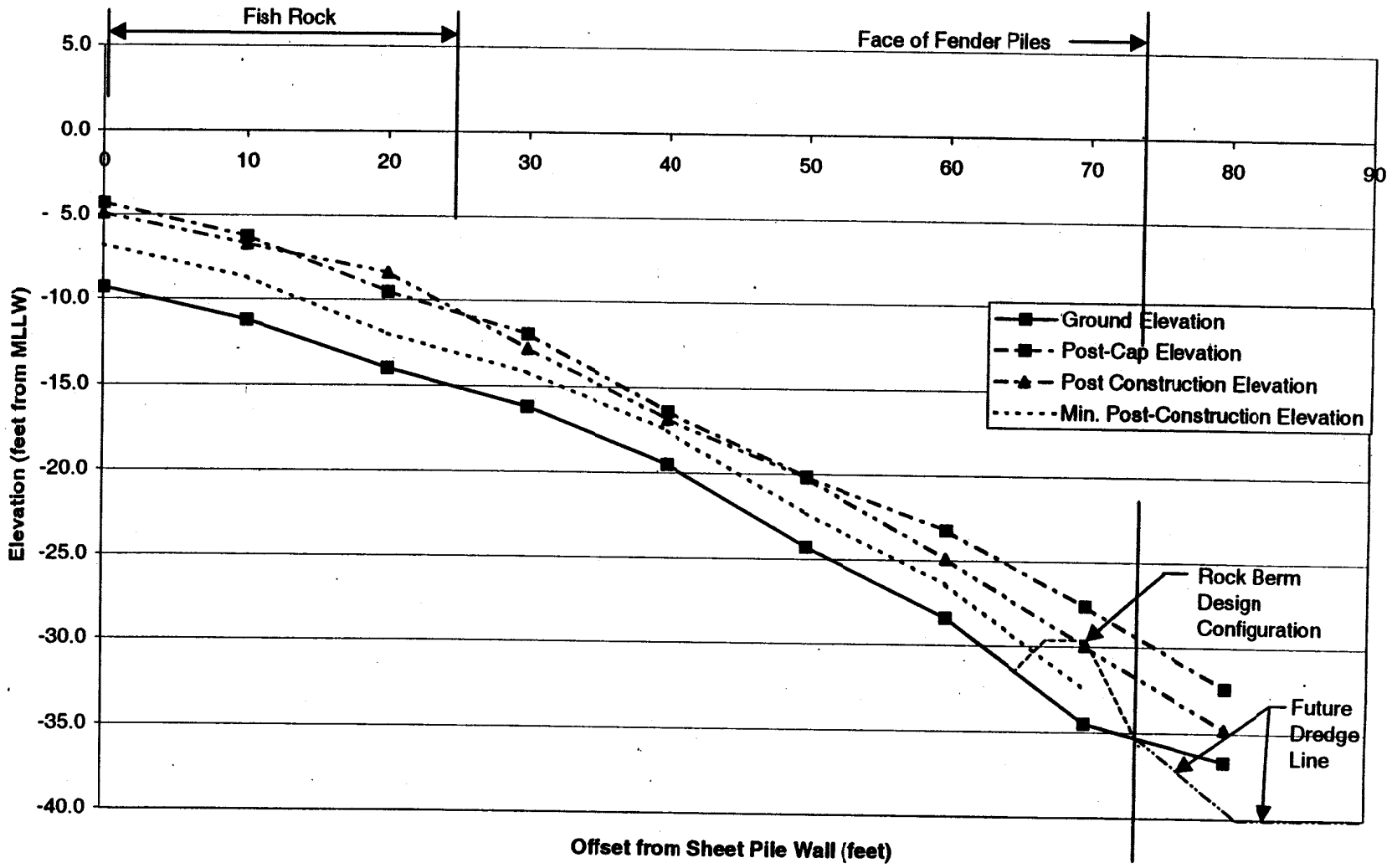


Figure 7 - Station #5 Showing Future Dredge Line



APPENDIX A
CONSTRUCTION PHOTOGRAPHS

Photo 1 – Geotextile Fabric; Amoco Petromat 4545

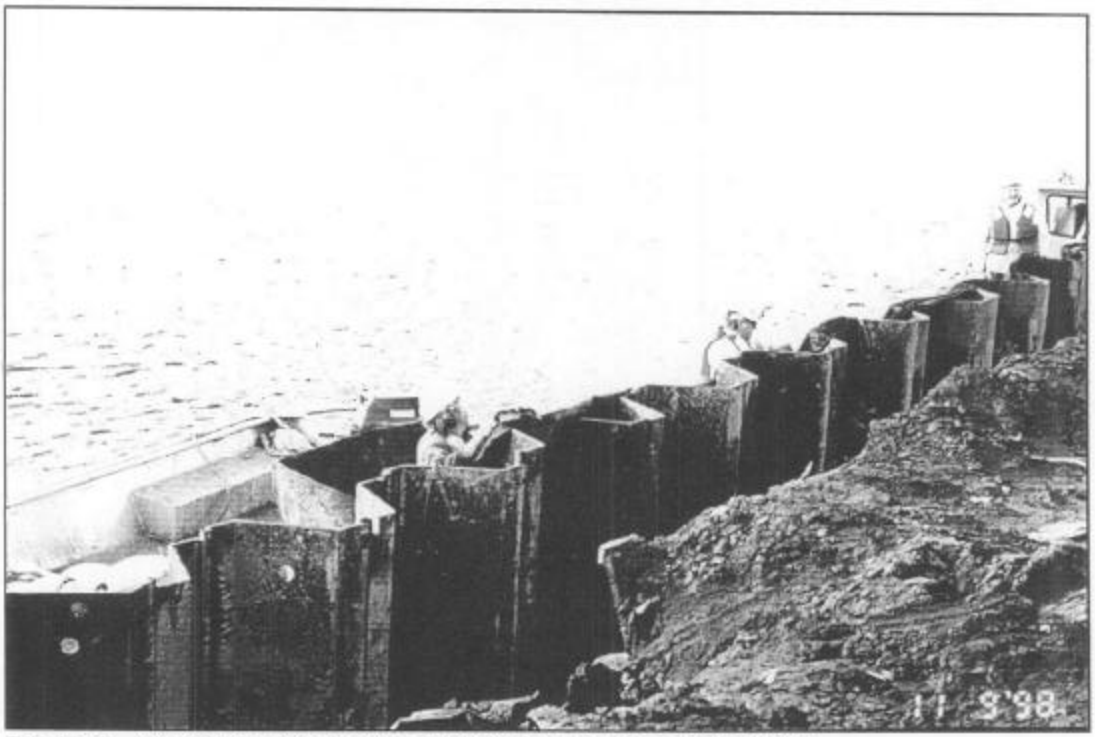


Photo 2 – Clamping Geotextile Fabric End to Sheet Pile Wall

Photo 3 – Holding Down Geotextile Fabric with Sand Bags

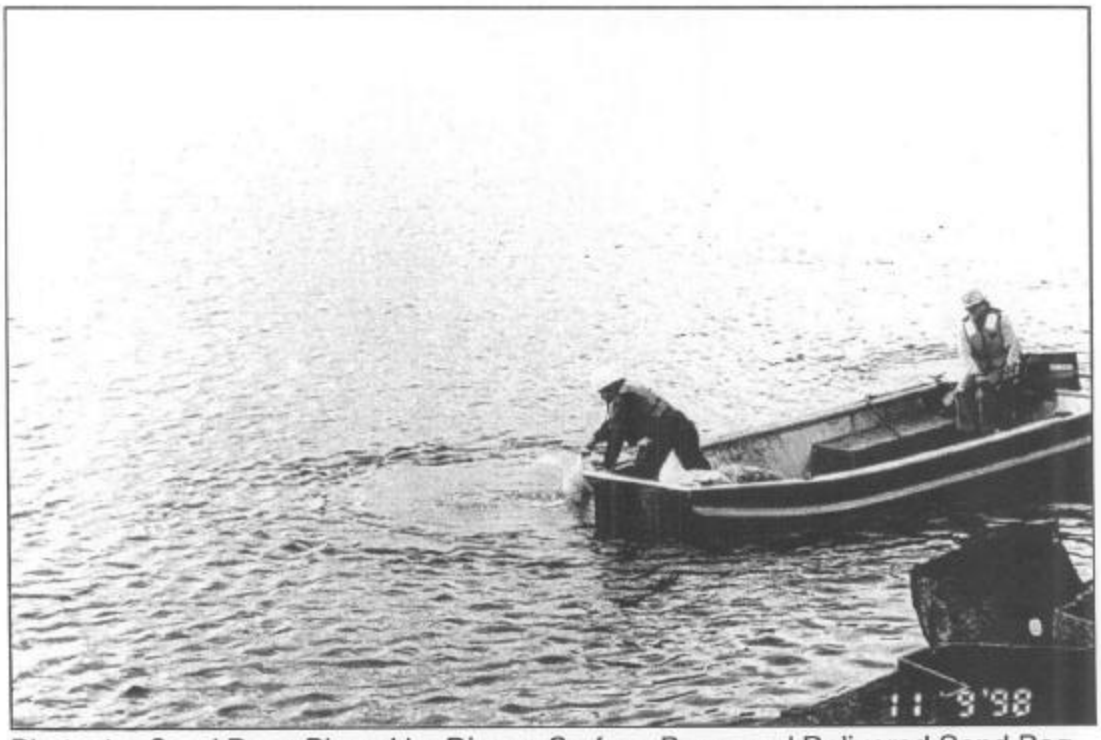


Photo 4 – Sand Bags Placed by Divers. Surface Personnel Delivered Sand Bag by Following Diver's Air Bubbles

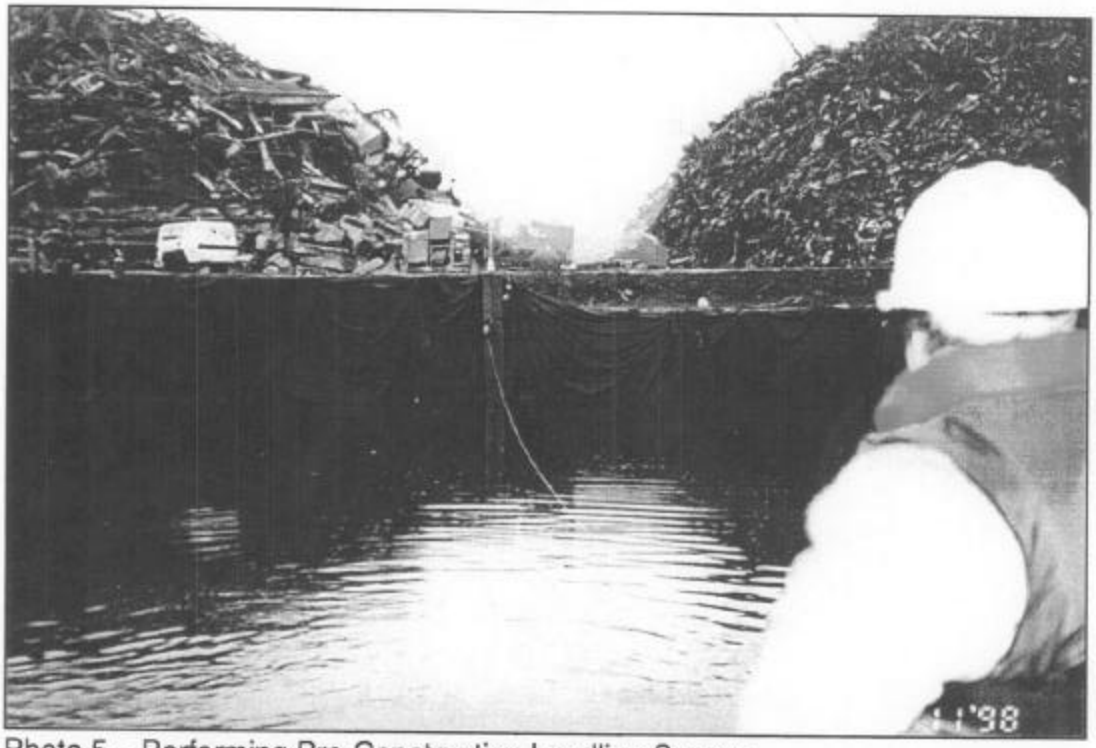


Photo 5 – Performing Pre-Construction Leadline Survey

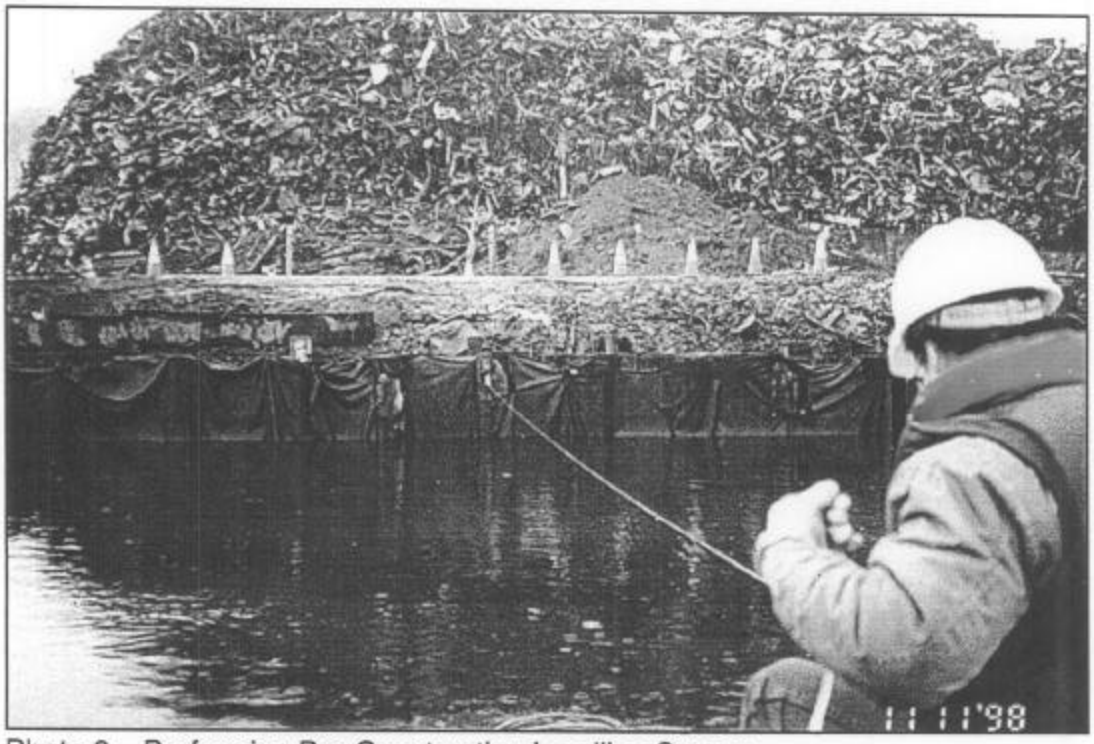


Photo 6 – Performing Pre-Construction Leadline Survey

Photo 7 – Tide Gauge Used on Leadline Survey

Photo 8 – Placing Riprap at North Return Wall

Photo 9 – Quarry Spalls Used for Building Toe Berm

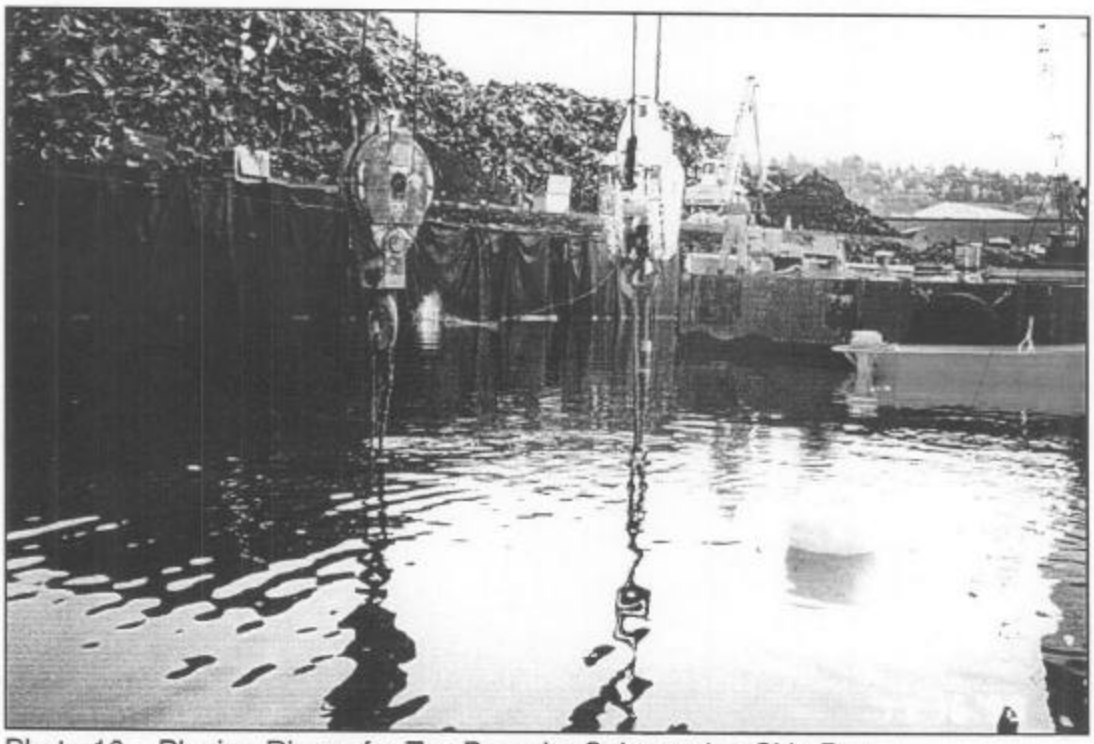


Photo 10 – Placing Riprap for Toe Berm by Submerging Skip Box

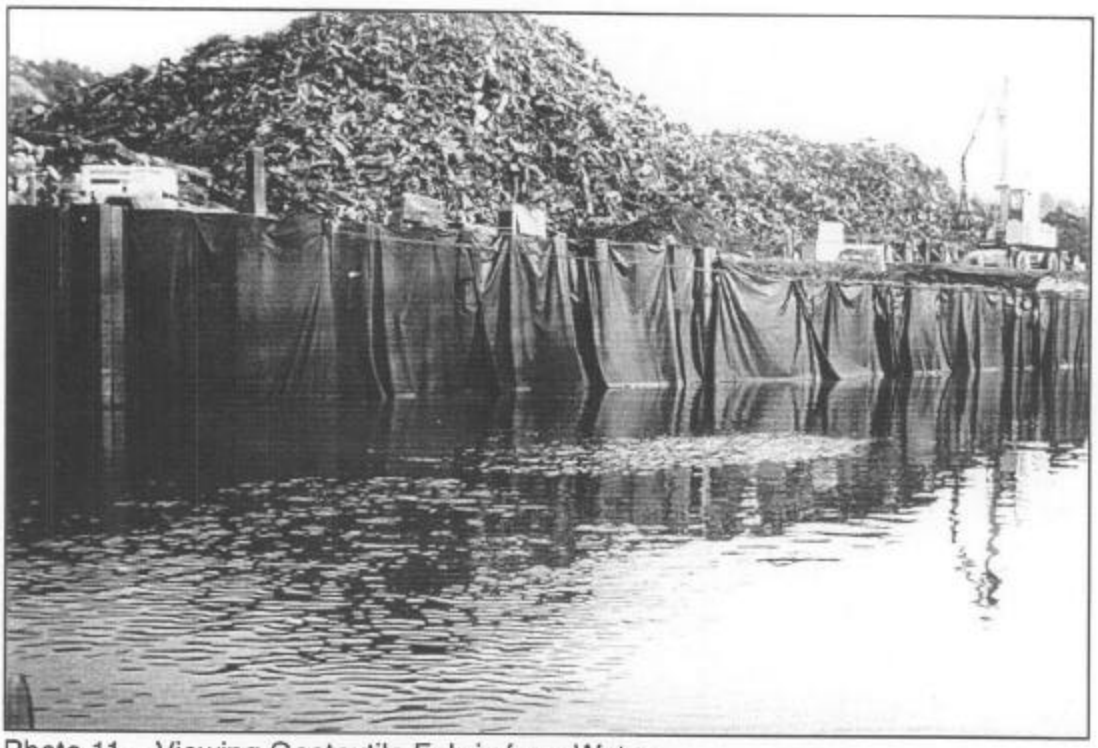


Photo 11 – Viewing Geotextile Fabric from Water

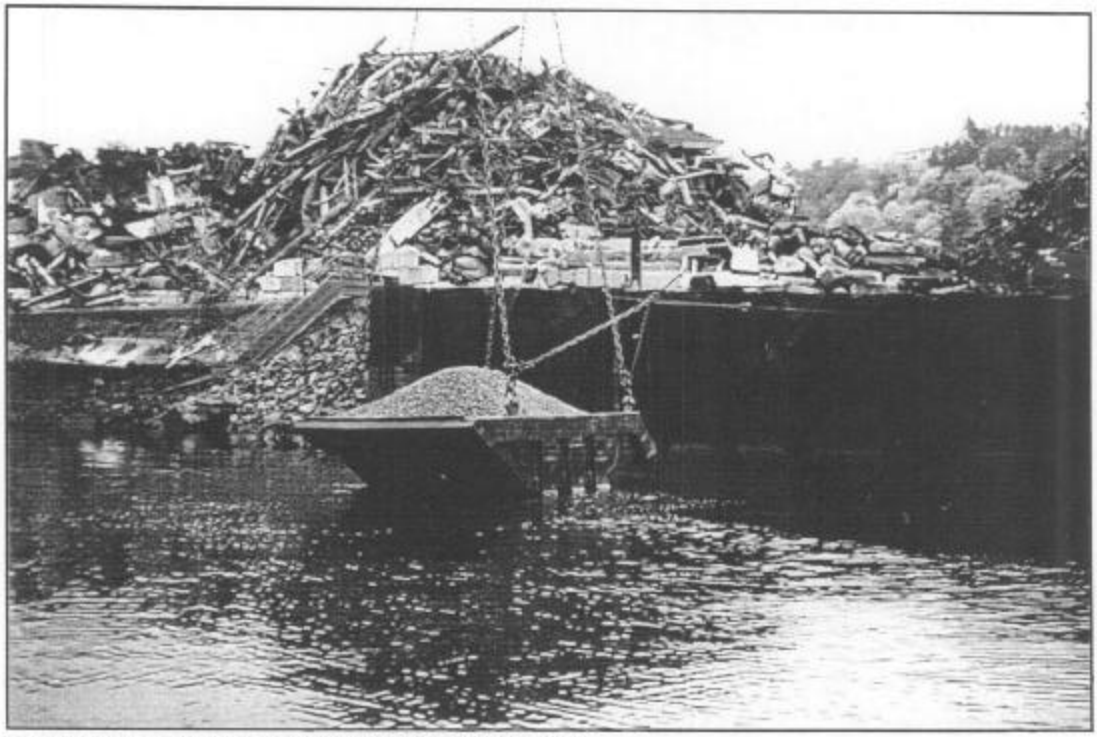


Photo 12 – Placing Sand and Gravel Layer

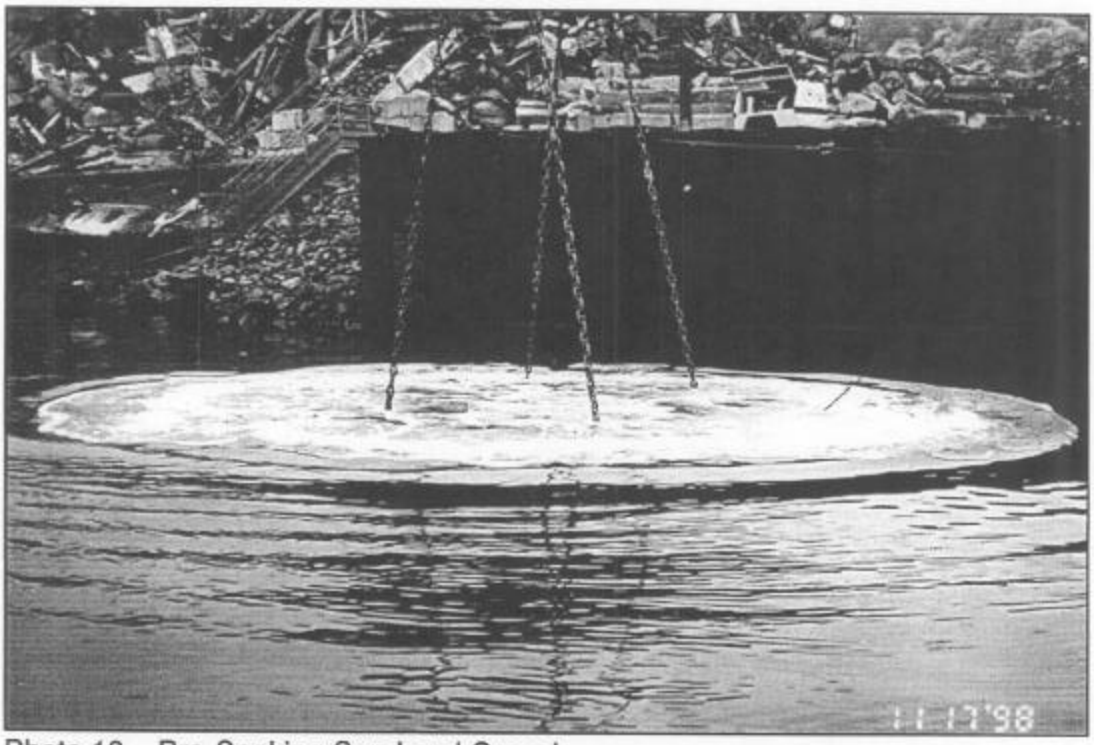


Photo 13 – Pre-Soaking Sand and Gravel

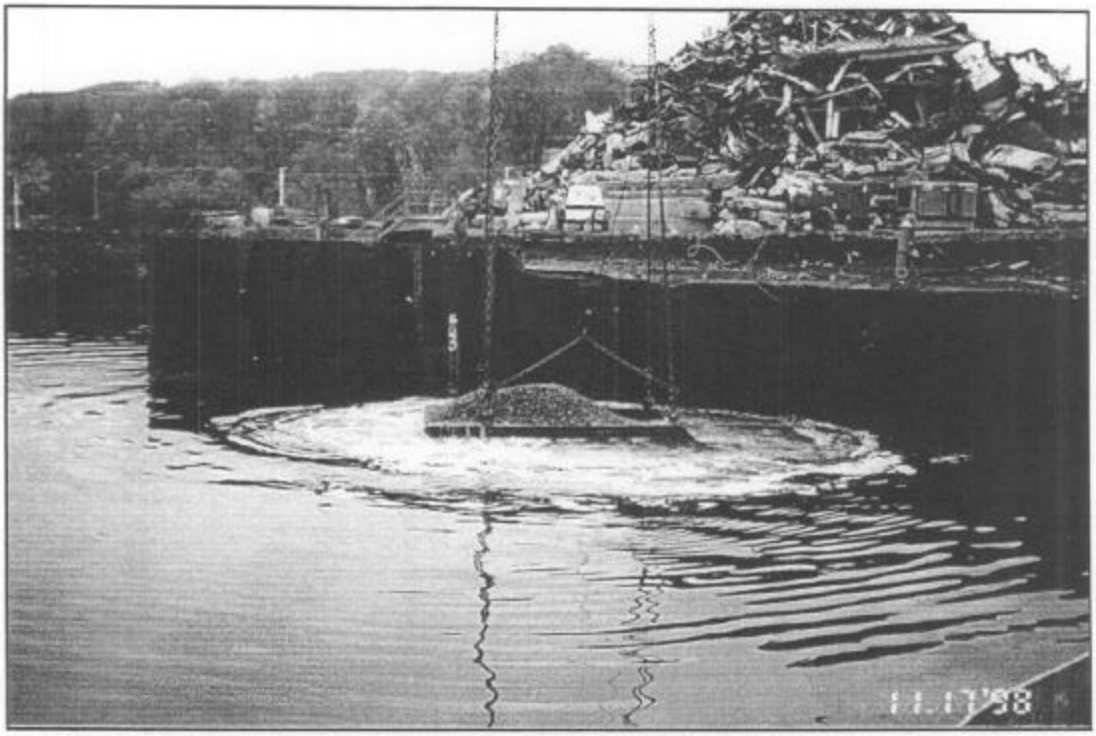


Photo 14 – Raising Bucket Before Placing Sand and Gravel

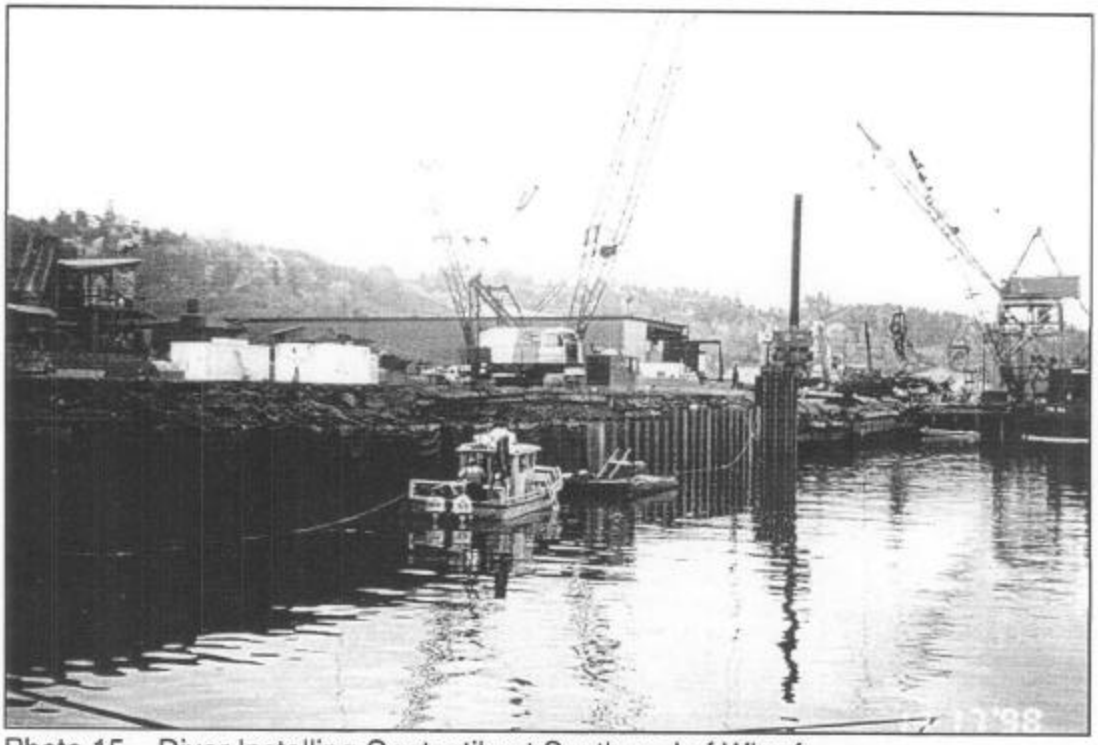


Photo 15 – Diver Installing Geotextile at South end of Wharf

Photo 16 – Close-Up View of Sand and Gravel on Barge

Photo 17 – Placing Rock Berm at South end

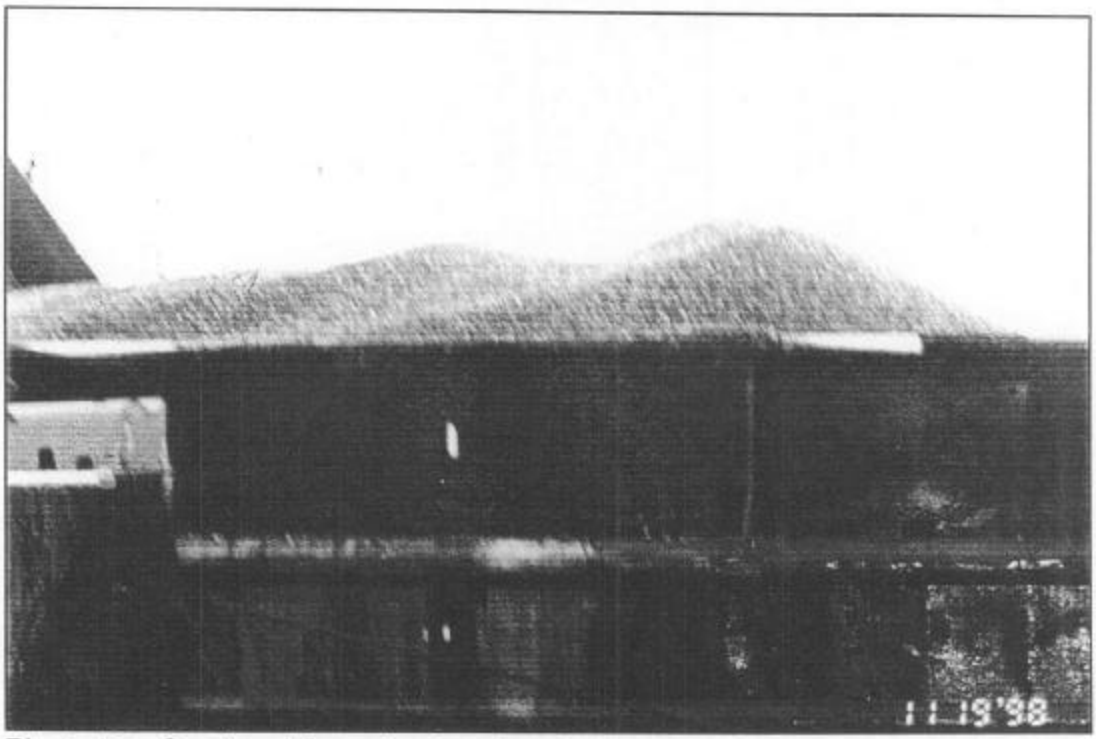


Photo 18 – Sand and Gravel at South end

Photo 19 – Geotextile Untied from Sheet Pile Wall before Placing Riprap

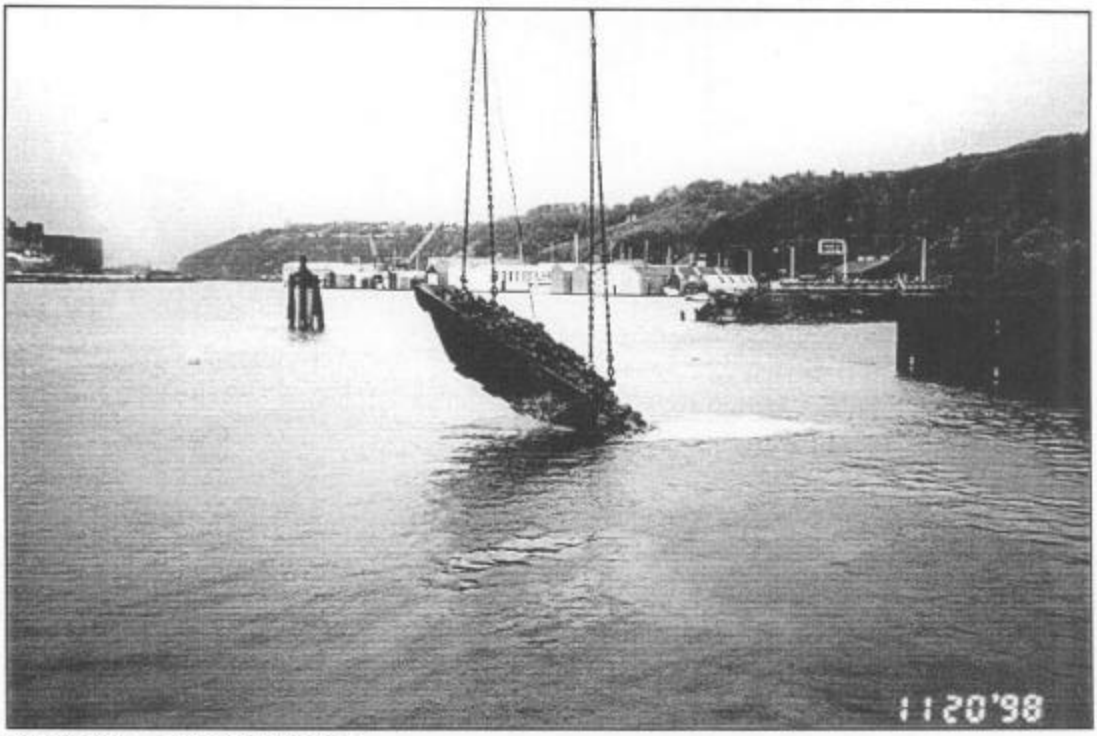


Photo 20 – Placing Riprap

Photo 21 – Loading Fishrock

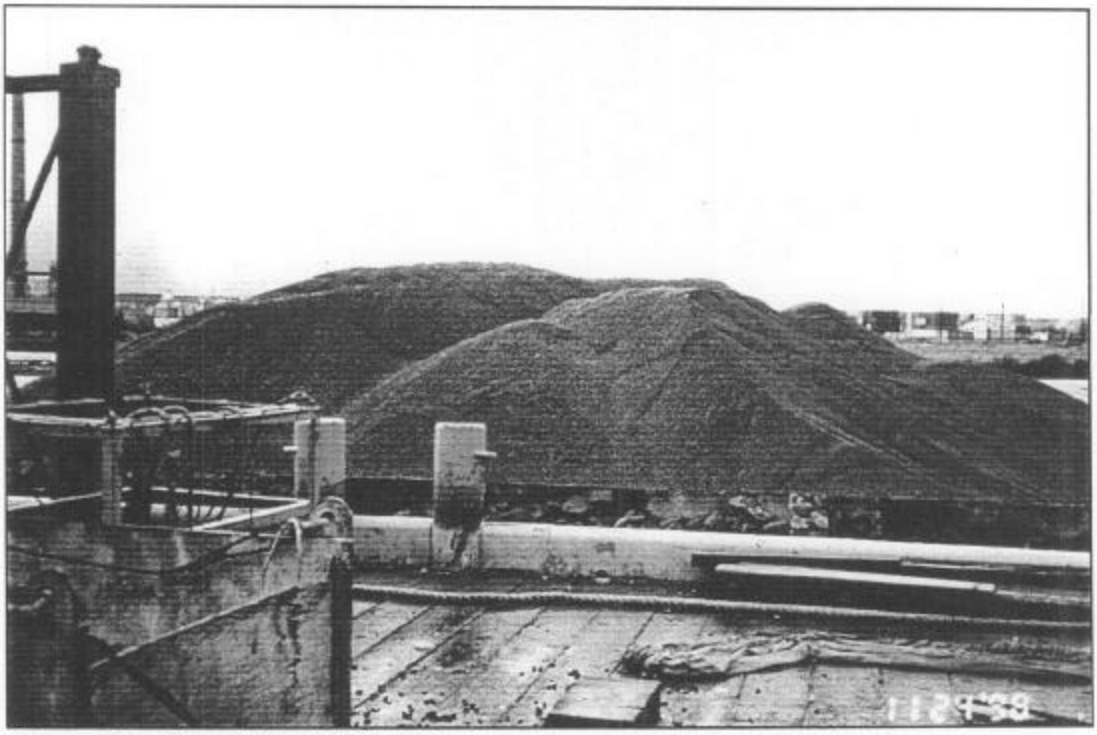


Photo 22 – Close-Up of Fishrock

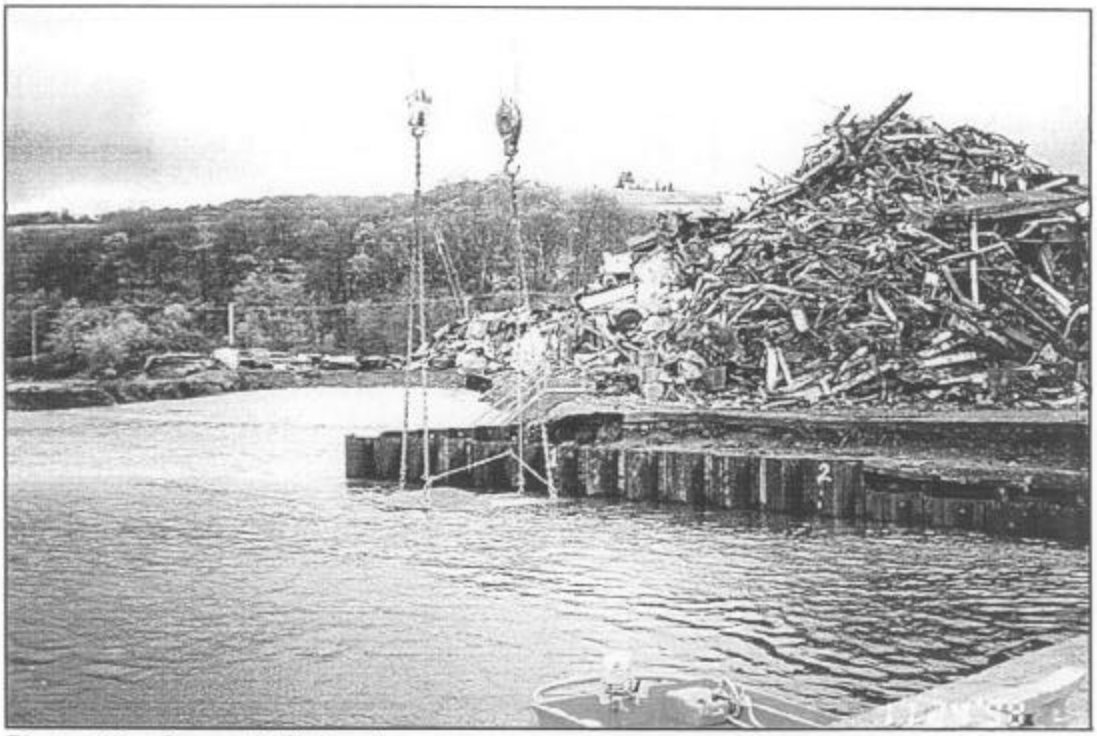


Photo 23 – Presoak Fishrock

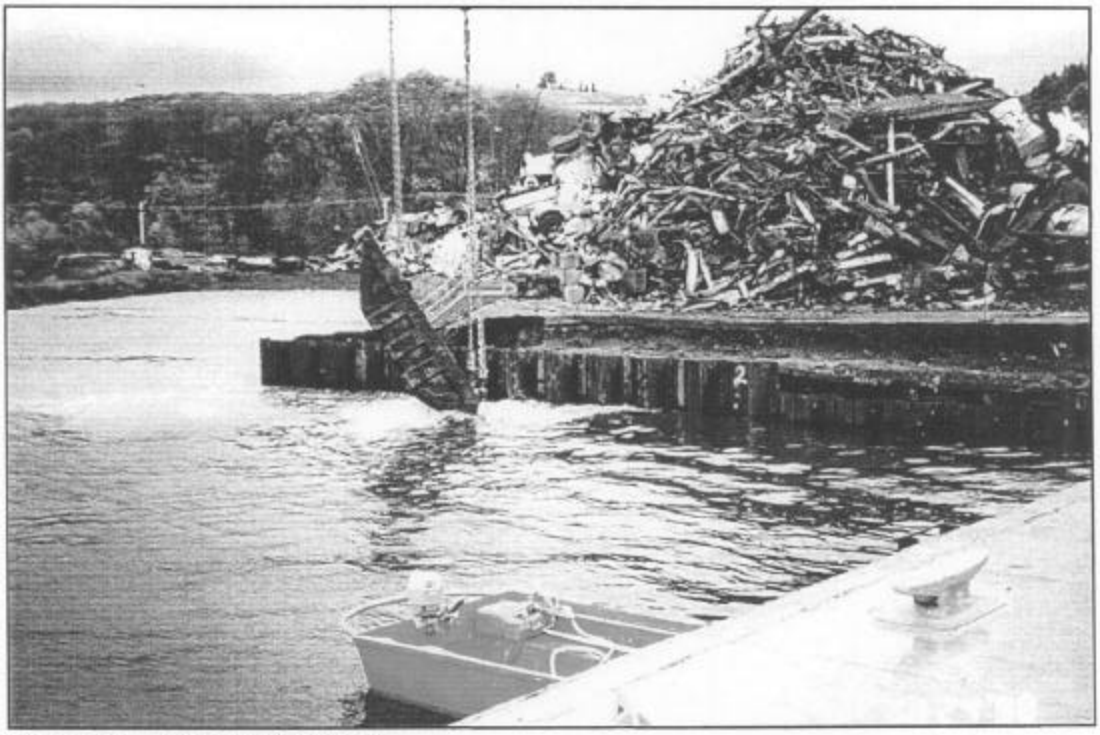


Photo 24 – Placing Fishrock

Photo 25 – Additional Riprap by Truck

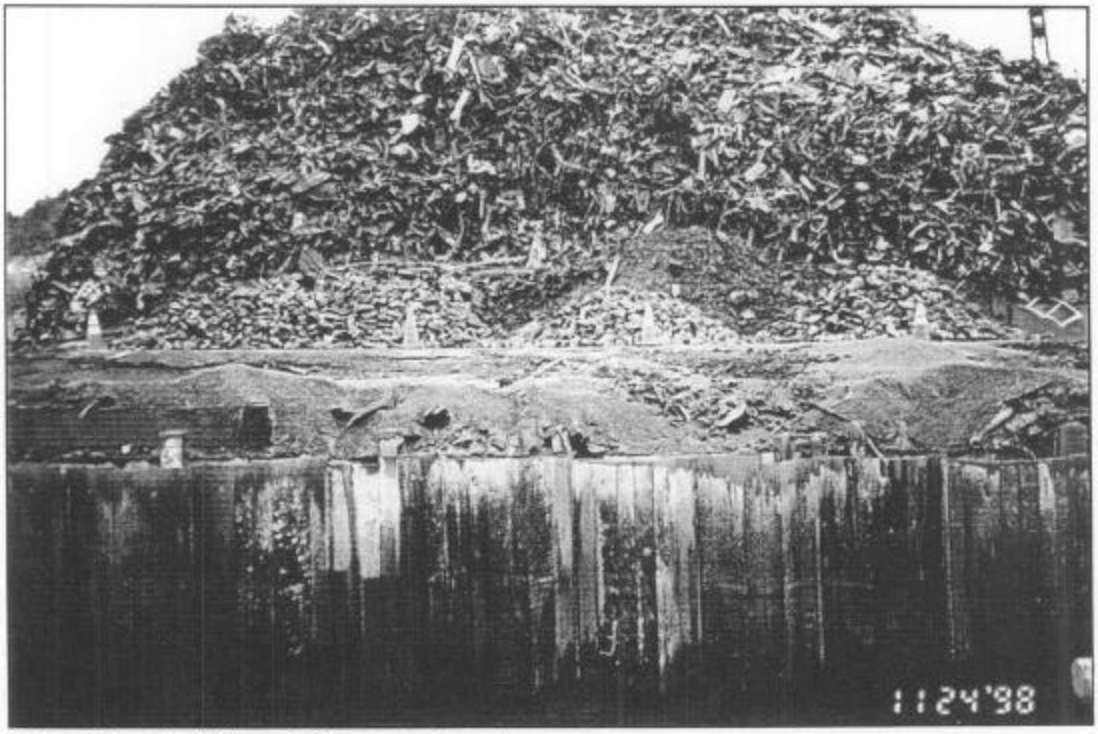


Photo 26 – Additional Riprap on Land

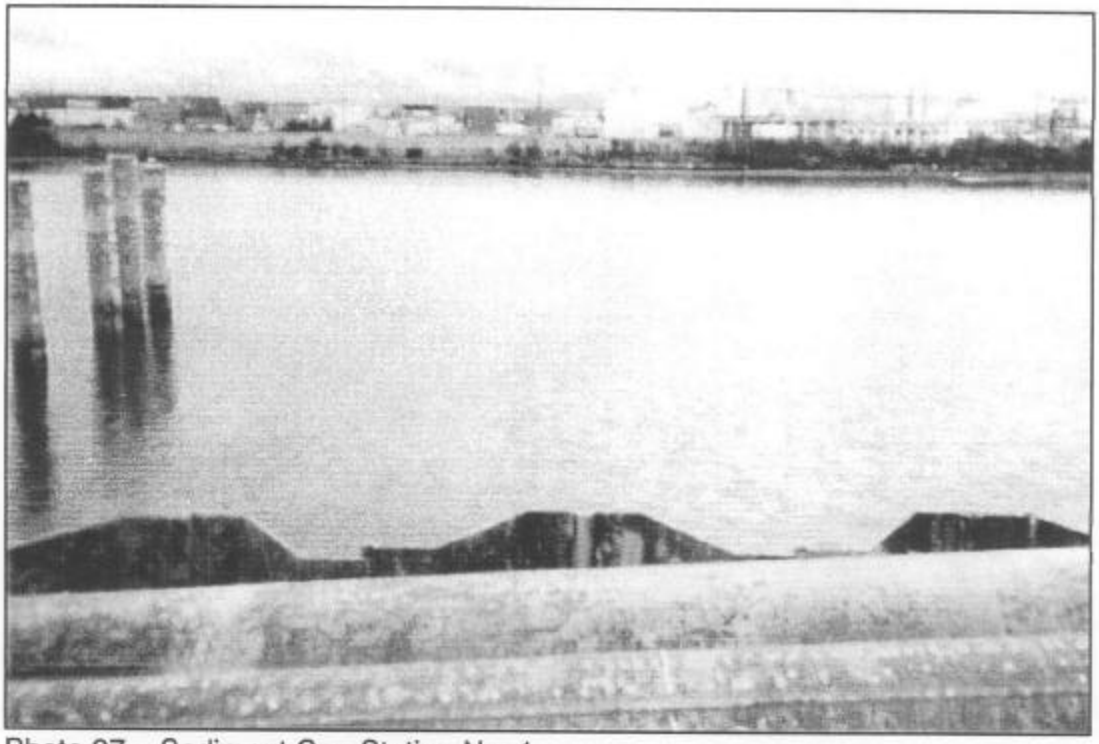


Photo 27 – Sediment Cap Station No. 1

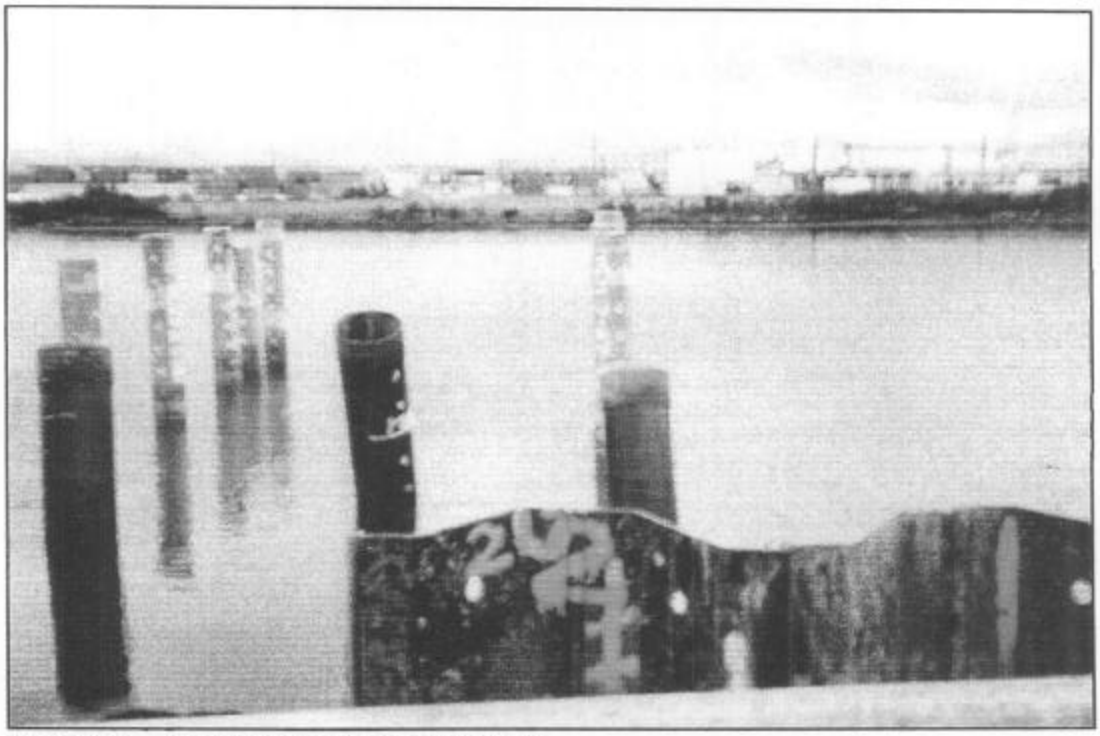


Photo 28 – Sediment Cap Station No. 2

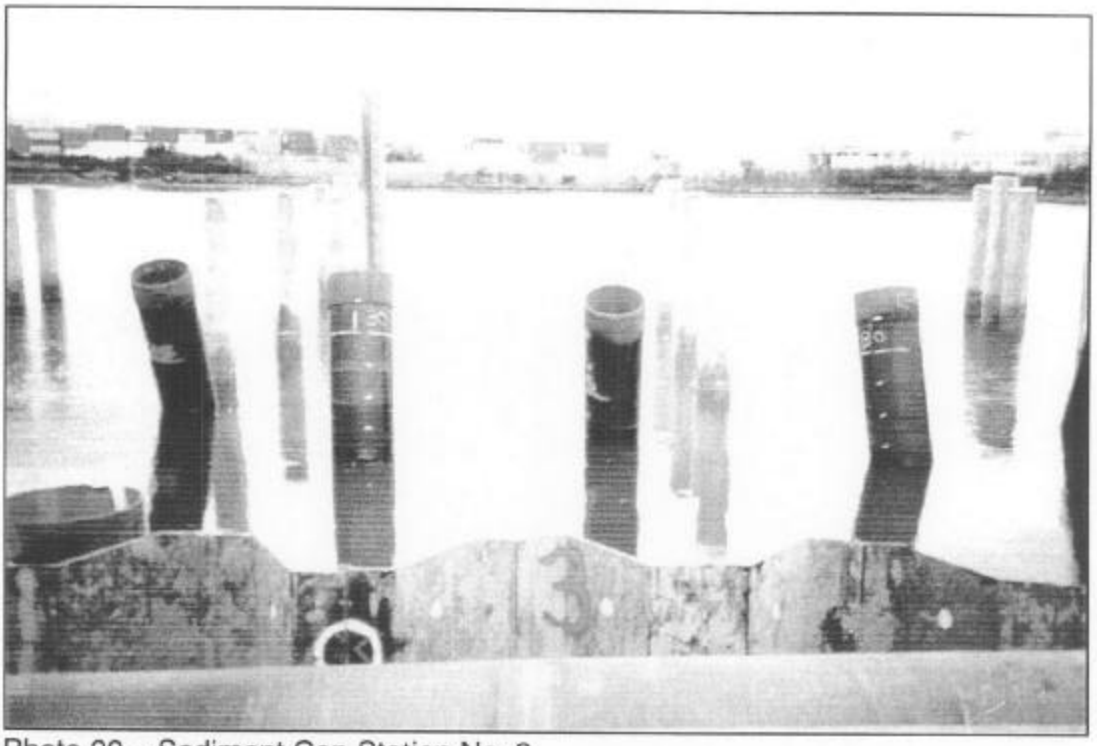


Photo 29 – Sediment Cap Station No. 3

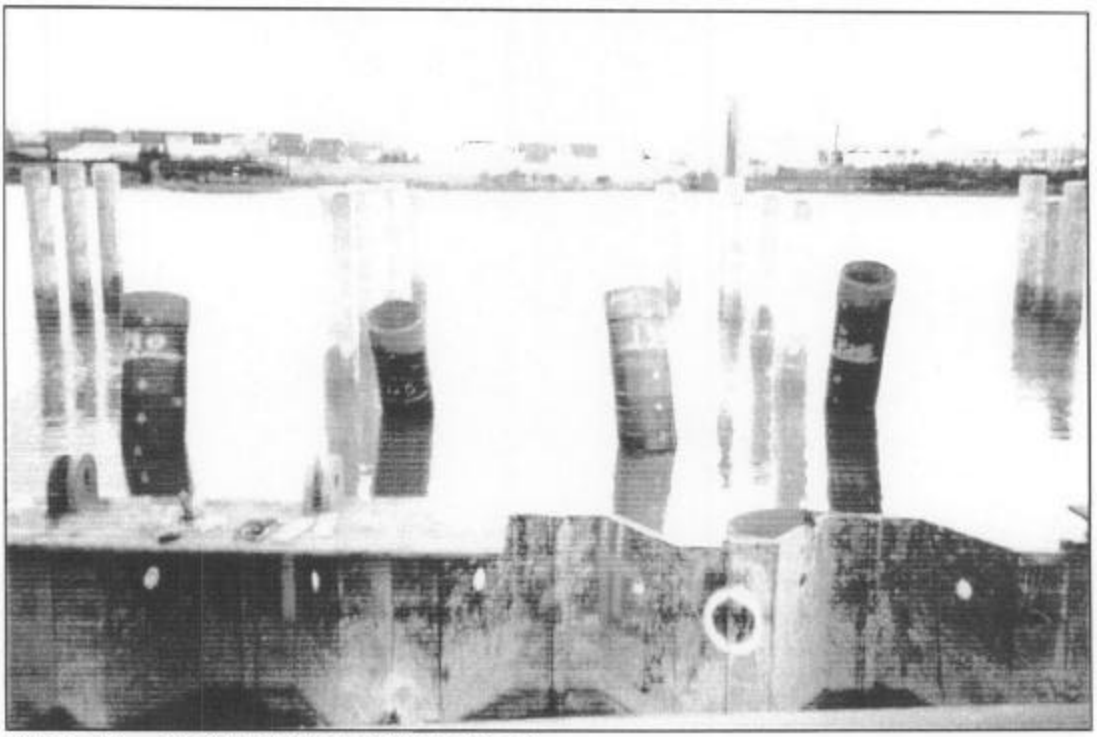


Photo 30 – Sediment Cap Station No. 4

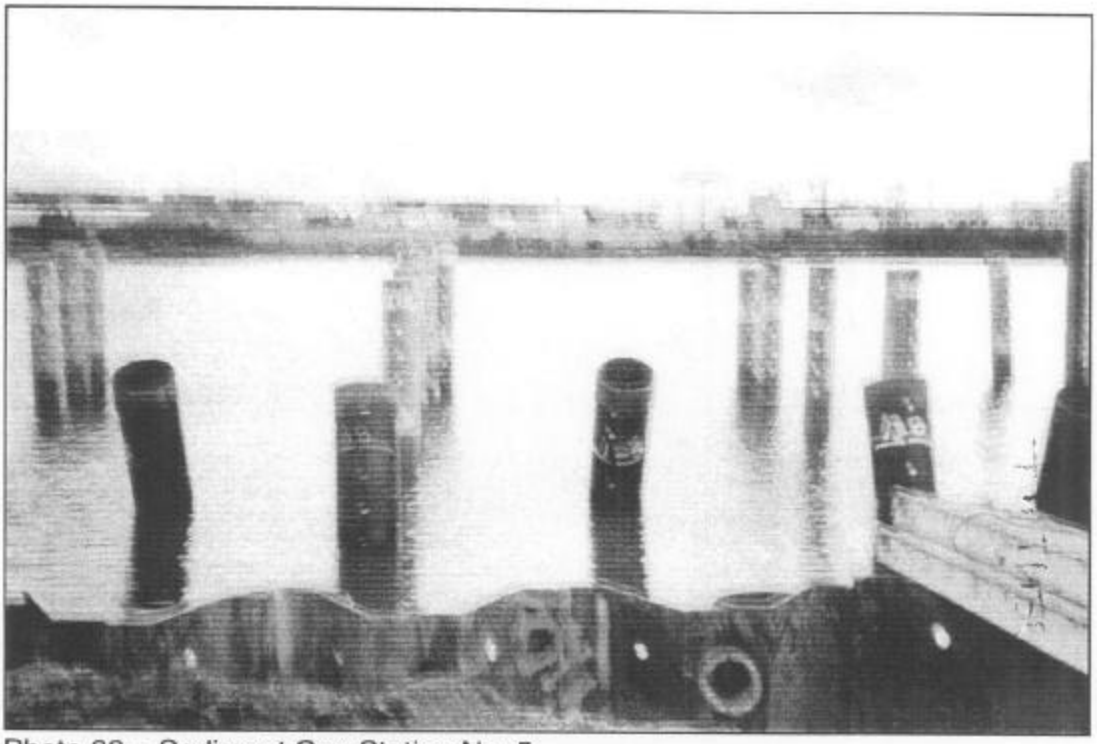


Photo 33 – Sediment Cap Station No. 5

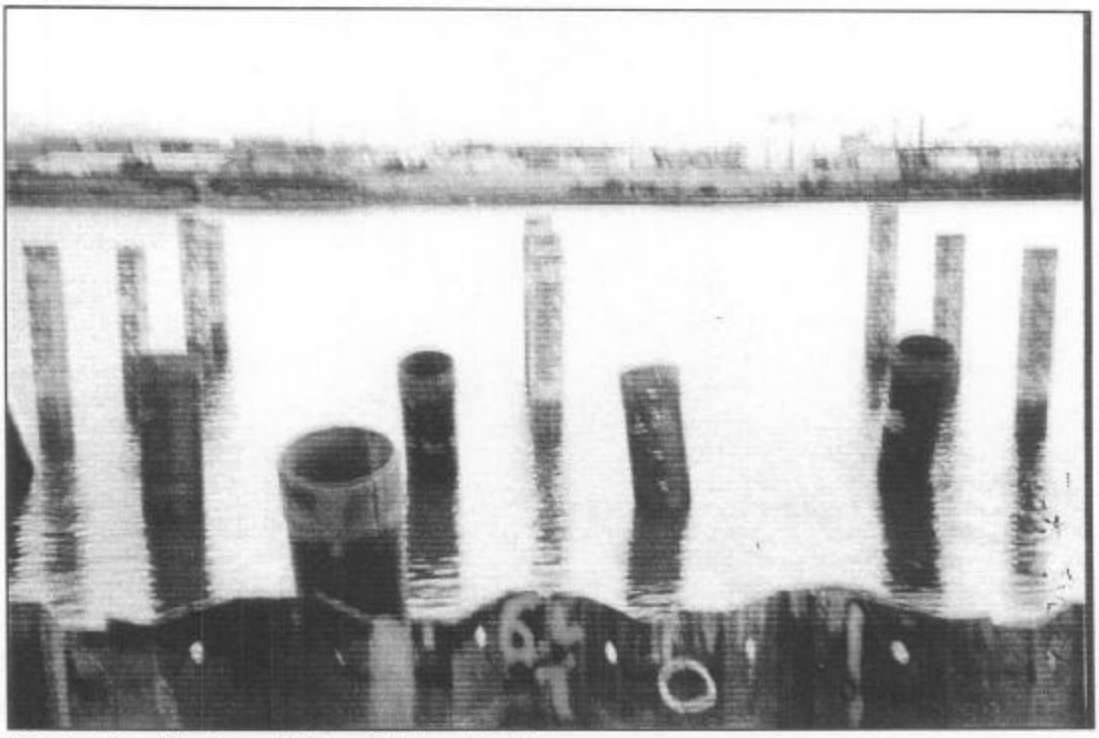


Photo 34 – Sediment Cap Station No. 6

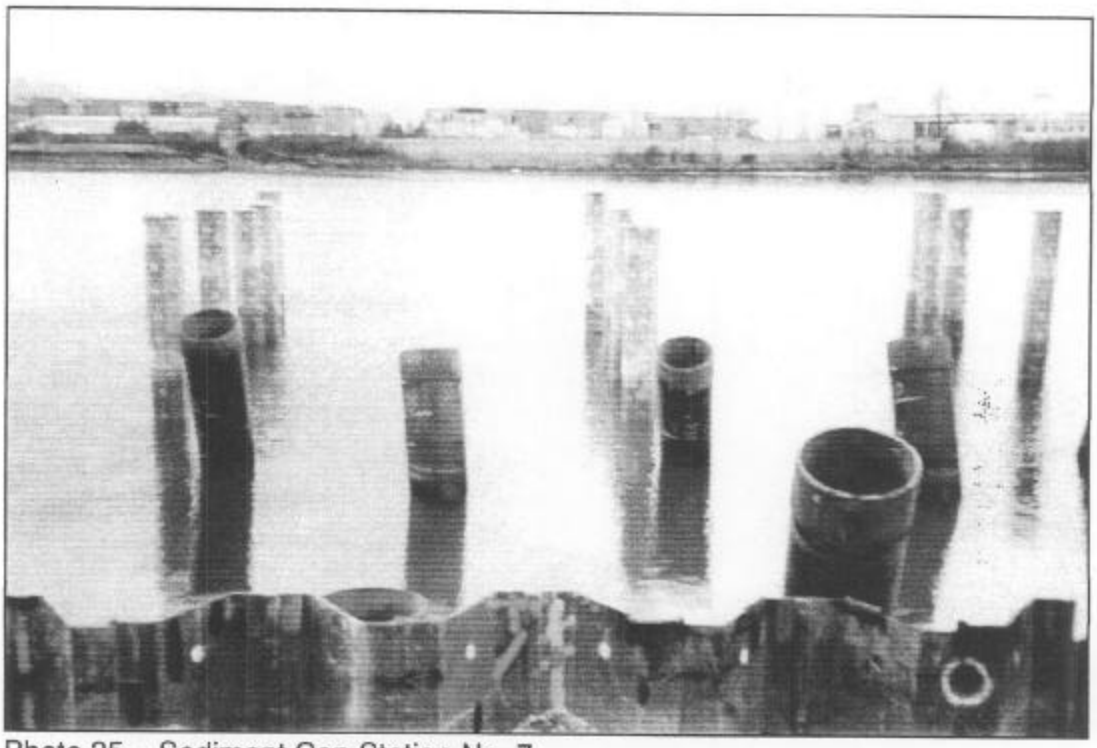


Photo 35 – Sediment Cap Station No. 7

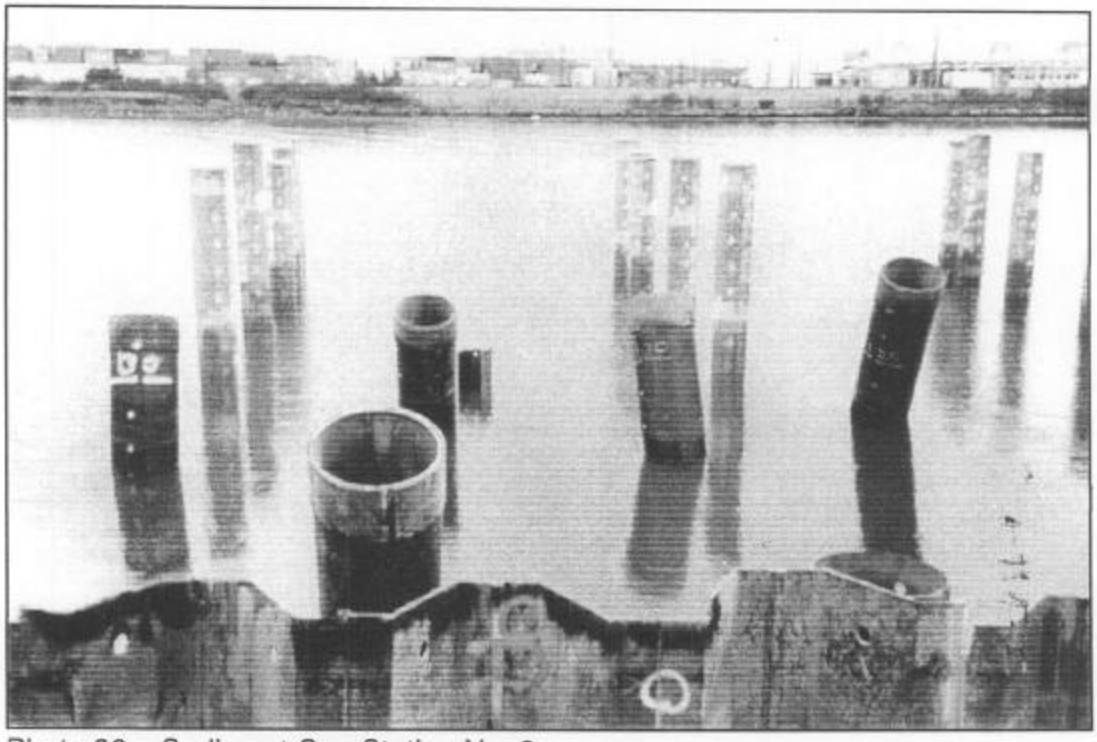


Photo 36 – Sediment Cap Station No. 8

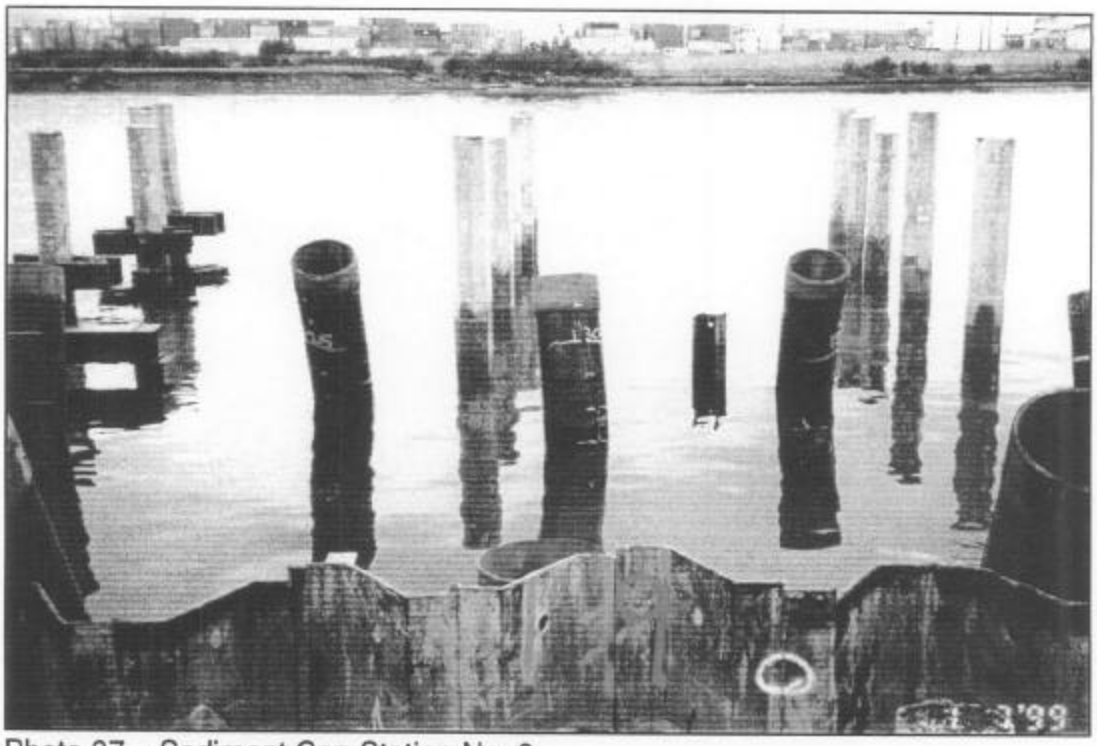


Photo 37 – Sediment Cap Station No. 9

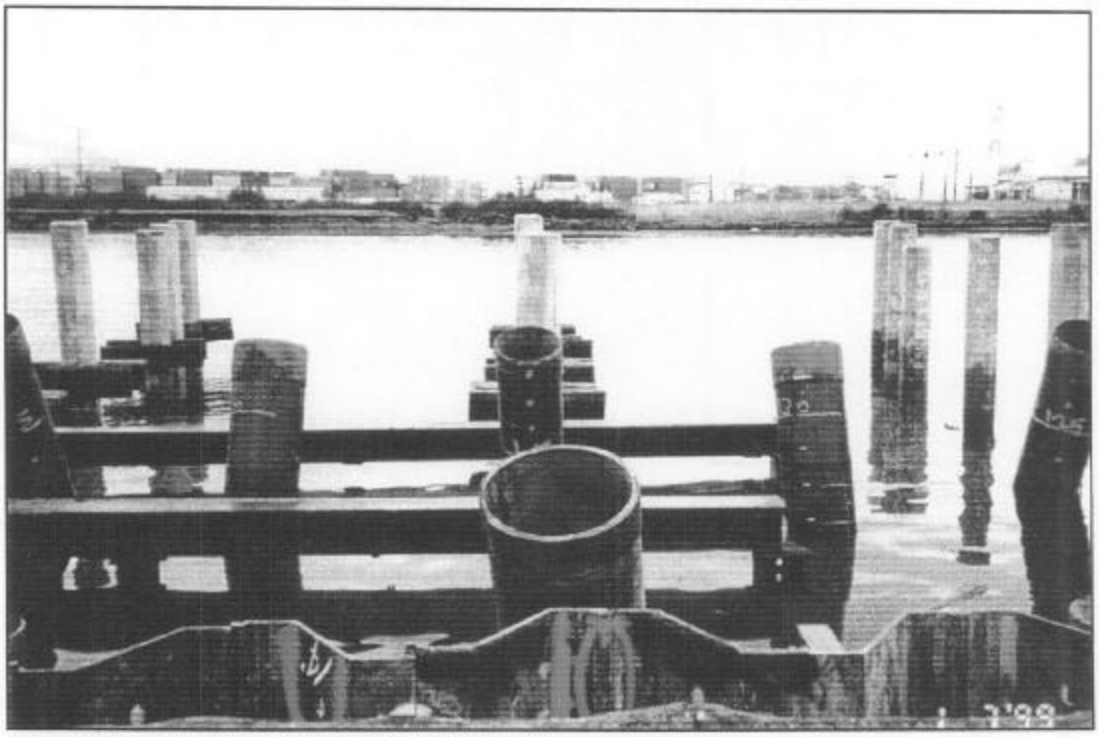


Photo 38 – Sediment Cap Station No. 10

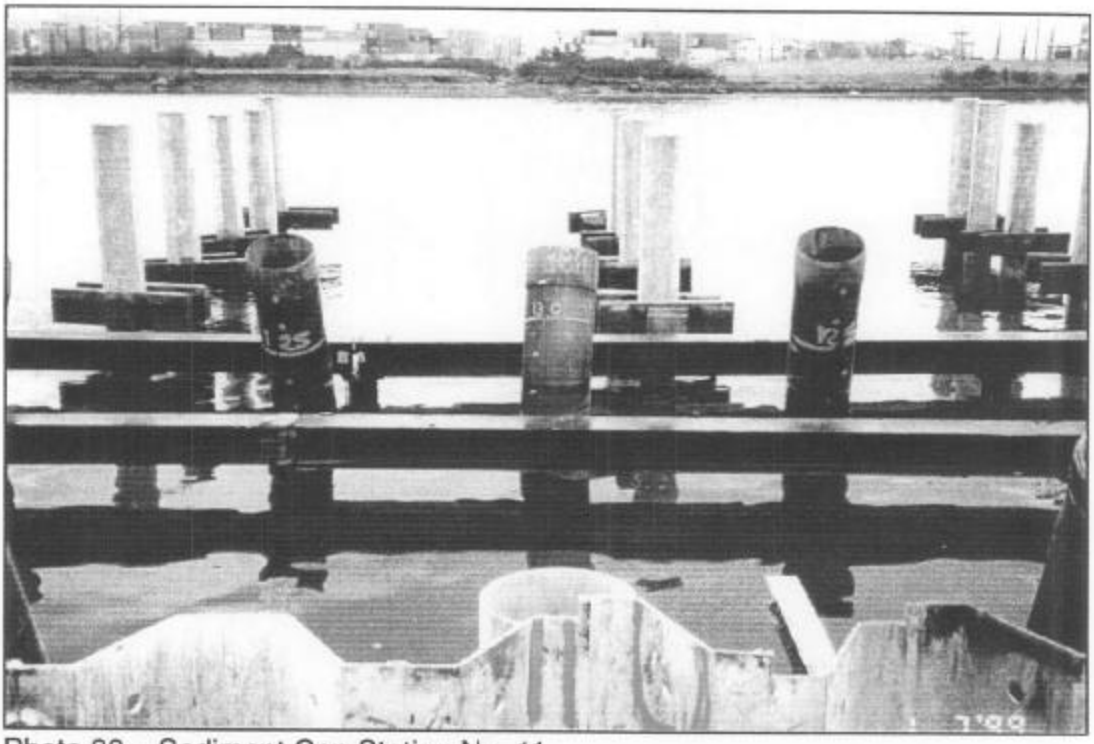


Photo 39 – Sediment Cap Station No. 11

Photo 40 – Sediment Cap Station No. 12

Photo 41 – Sediment Cap Station No. 13

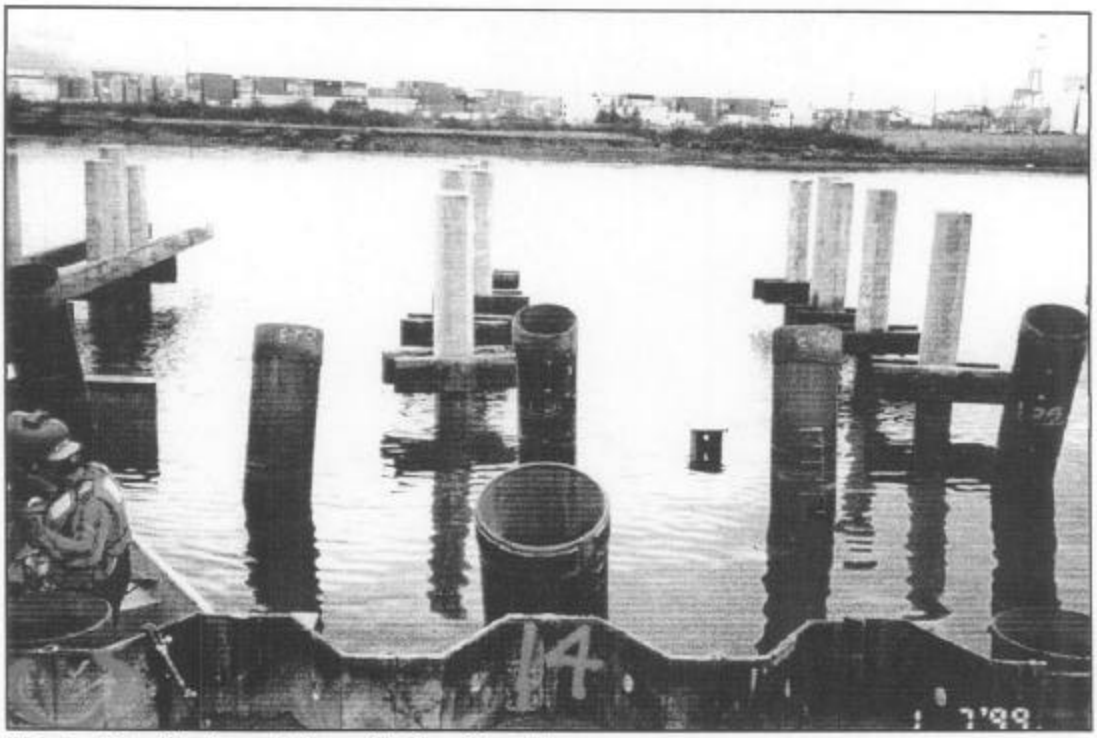


Photo 42 – Sediment Cap Station No. 14

Photo 43 – Sediment Cap Station No. 15

Photo 44 – Sediment Cap Station No. 16

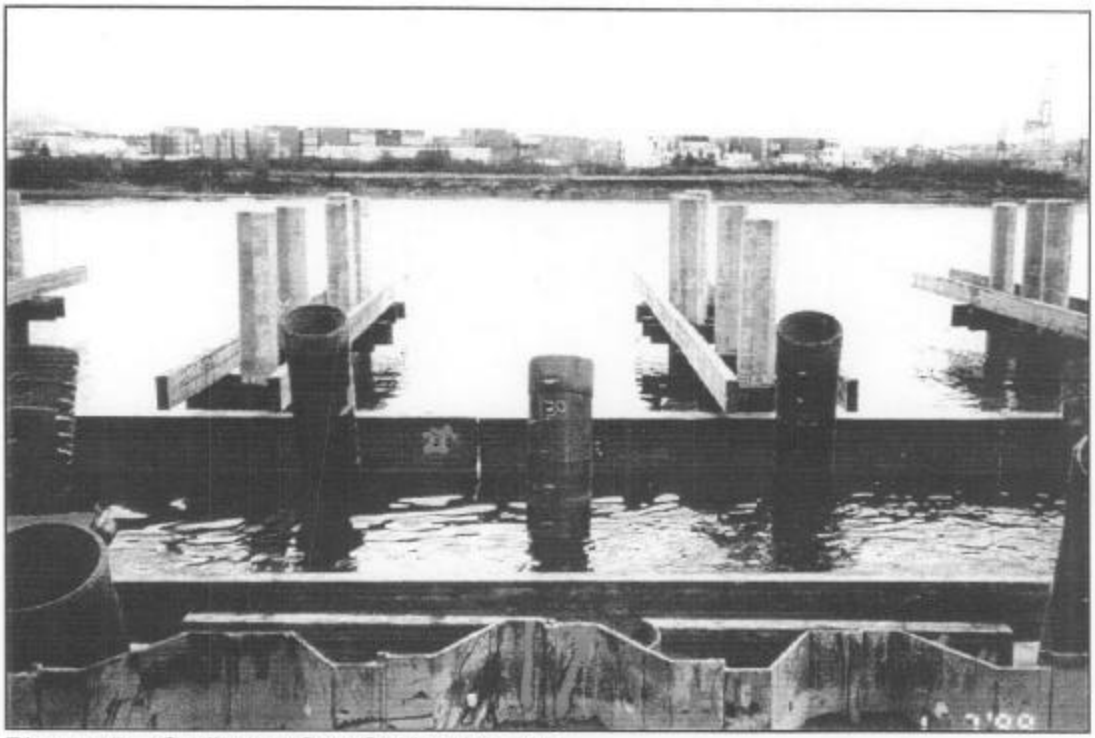


Photo 45 – Sediment Cap Station No. 17

Photo 46 – Sediment Cap Station No. 18

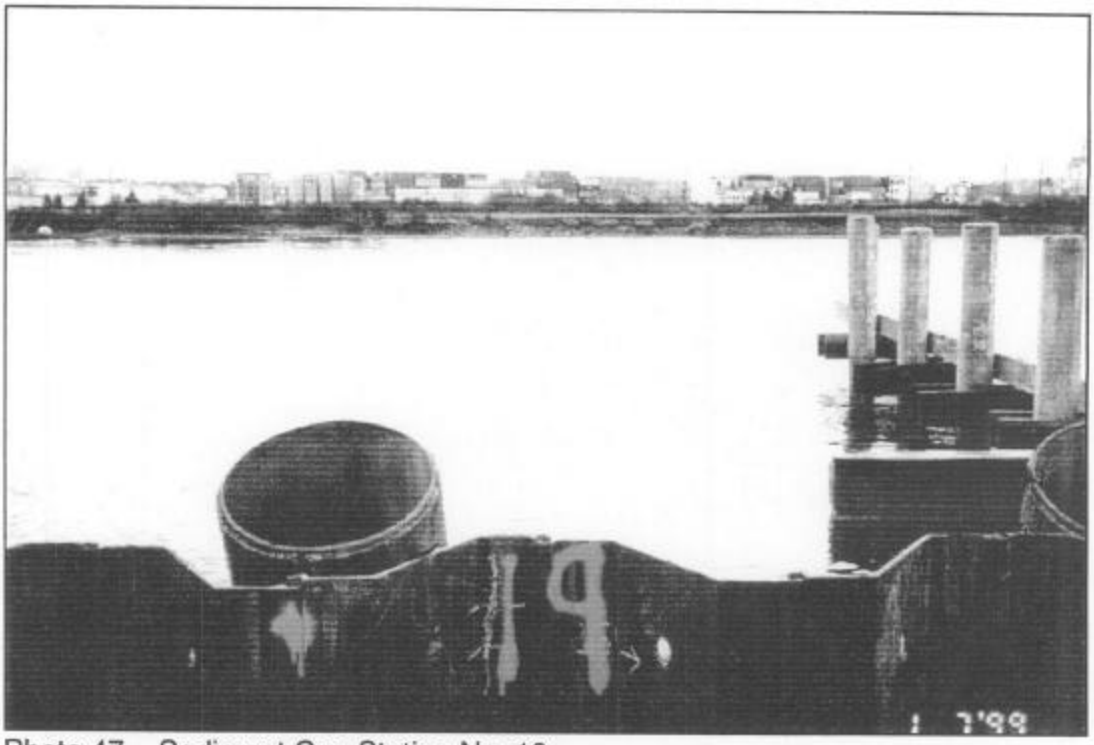


Photo 47 – Sediment Cap Station No. 19

APPENDIX B
LETTER OF ACCEPTANCE

BERGER ABAM ENGINEERS INC
3330 Ninth Avenue South
Federal Way WA 98003-6395
206/431-2300 • FAX 206/431-2250

BERGER/ABAM
ENGINEERS INC.

PLANNING
ENGINEERING
ENVIRONMENTAL
PROGRAM MANAGEMENT

7 January 1999

Mr. Phil Wallace
General Construction Company
3838 West Marginal Way SW
Seattle, WA 98106

Subject: Construction of Intertidal and Shallow Subtidal Sediment Cap
at General Metals of Tacoma (Schnitzer Steel)

Dear Mr. Wallace:

This letter is to confirm that construction and all required remedial work on the sediment cap constructed by General Construction for Schnitzer Steel in Tacoma, Washington, has been completed in accordance with the intent of the requirements of the approved work plan.

The acceptance of the cap are based on the following information.

- Preconstruction survey of Stations 1 to 19
- Observation of installation and placement of geotextile fabric
- Observation of placement techniques of fines and coarse aggregate, riprap, and fish rock
- Postcapping survey of Stations 1 to 19
- Remedial action of postcapping at various low spots
- Postconstruction survey of Stations 1 to 19
- Remedial action of postconstruction at various low spots

Documentation of the basis for our acceptance will be included in the final report on sediment cap construction, which is currently being prepared. If you have any questions, please call me at 206/431-2300.

Sincerely,

Frank L. Yang, PE
Senior Engineer

FLY:nm

cc: Tim Todd, Schnitzer Steel
Dennis Griffith, Schnitzer Steel

APPENDIX C
INSPECTORS DAILY REPORTS

ABAM REPRESENTATIVE'S DAILY REPORT

PROJECT: SCHNITZER STEEL **DATE:** 1-6-99

OWNER: SCHNITZER / GENERAL **JOB NO.** A99025

WEATHER: CLOUDY / 50°

MANPOWER: FULL CREW ON LAND AND ON DERRICK.

EQUIPMENT —

WORK PERFORMED: DROVE STEEL BATTER PICES SOUTH OF WARF # 178 - # 185. PLACED FORM WORK FOR PILE CAPS, INSTALLING FRICTION COLLARS, WELDING GLVE LAM REINFORCEMENT TO SHEET PILE WALL, SETTING FORM WORK H PICES, AND SETTING BEAMS ACROSS H PILES, PLACEMENT OF RIP RAP AND PEE GRAVEL FOR LOW SPOTS IN WARF.

REMARKS: LOW SPOTS WERE FILLED AT BTA. 1, 2, 11, 13, & 19. ELEVATIONS WERE TAKEN AND REQUIRED COVER WAS ~~ACHIEVED~~ ACHIEVED. GENERAL USED 1 TRUCK OF RIP RAP AND 1 TRUCK OF PEE GRAVEL. GENERAL USED THE LAND CRANE WITH A DUMP BOX TO PLACE THE MATERIAL, APPROX. 60 TONS TOTAL.

INSPECTOR: Chris Barnes

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Mon 1/4/99
Time In: 7:30 am Time Out: 11:30 am

Description of site visit: I went down to Schnitzer Steel at 7:30 this morning, to finish up the rest of the post construction survey. I let Phil know that I found several low spots during last week's survey. I then proceed to finish the rest of the survey, starting from station 13 (I skipped this one last week), and work my way north. The skiff maneuvering was somewhat challenging, due to driving piles and temp shoring. But I manage to get all the reading. Starting at station 5 to station 1. I was not able to spot the tide gage at the south end (numerous construction activities were in between the tide board and me). The tide board at the north end was knocked down during anchor relocation of the pile-driving derrick several weeks ago. I used the last rate of change of tide (approximately 0.3' per station) to estimate the tide of the last five stations. I check the final tide as the skiff pull back to the south end, my estimate were close.

I work out all the elevations, and found that five of the surveyed points were low. I faxed the results to Phil Wallace for post construction remedial actions.

Materials used/Volume: NA

A-E Signature Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Thu 12/31/98
Time In: 8:30 am Time Out: 12:00 pm

Description of site visit: Per the request of Phil Wallace of General Construction, I went to Schnitzer Steel today to perform the post construction survey. Since it is a day before holiday, General Construction will break at noontime. I finish sounding from station 19 to station 9, with the exception of station 13 (due to interference with other workers). I told Phil Wallace that I'd be back on Monday, January 4th, 1999, at 7:30 to finish the rest of the sounding. I'd also give him the preliminary result of the bottom elevation based on today's survey.

Materials used/Volume: NA

A-E Signature Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Wed 11/25/98
Time In: 7:30 am Time Out: 2:30 pm

Description of site visit: Miscellaneous riprap was finished being placed today. The rest of the fish rock was also placed. The hydraulic line of the rock dozer broke right before noon. The crew spent their lunchtime to contain the hydraulic fluid spill on the sand and gravel barge. New lines were brought in and installed after 1 p.m.. I finished checking the last fish rock elevation at around 2 p.m., and left the site. The final bottom elevations are enclosed.

Materials used/Volume: 607 tons of fish rock delivered by barge.

A-E Signature

11/25/98
Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Tue 11/24/98
Time In: 7:30 am Time Out: 5:00 pm

Description of site visit: I presented the result of low areas to Phil Wallace of General Construction. As expected, Stations 19 and 20 were low. In addition, Station 3 and several other spots were also low. Phil Wallace of General Construction scratched Station 20 from the survey at his discretion, and ordered four truckloads of riprap to fill the other low spots. Fish rock was installed today. The original scope calls for installing fish rock to Elevation –6 feet. However, because the sheet pile wall moved out, the bottom elevation dropped several feet. Some spots were close to Elevation –6 feet at the sheet pile wall. General Construction decided to follow the intent of the scope and place 6 inches of fish rock from the sheet pile wall to at least 15 feet from the wall, regardless of the elevation. Fish rock was placed from Stations 1 to 12 today. Several of the riprap low spots at the north end were filled.

Materials used/Volume: 656 tons of fish rock delivered by barge. Misc. 4 truckload of misc. riprap.

A-E Signature

11/24/98
Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Mon 11/23/98
Time In: 7:30 am Time Out: 5:00 pm

Description of site visit: The derrick crew was complaining about the lack of control of the barge at the south end of the project, because the south end waterside anchor did not have a good grip. A tugboat came in to reset the anchor in the morning. According to the deck engineer, the derrick still was not stable even after they reset the anchor. In an attempt to move from south end to north end of the project, the barge ran into the freestanding sheet pile wall near Station 15. No damage to the sheet pile wall was observed. Due to the anchor-line locations, Stations 19 and 20 were placed at the back of the derrick. The barge ran out of rock when placing Stations 19 and 20. I told Phil Wallace of General Construction that I would tabulate the riprap profile and let him know the low spot by next morning.

Materials used/Volume: No new materials delivered.

A-E Signature

11/23/98
Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Sat 11/21/98
Time In: 10:30 am Time Out: 3:30 pm

Description of site visit: One of the back tires of the dozer was cut. The tire company inspected the tire and recommended the machine not be used until the tire was replaced. However, the deck crew decided to keep working until the tire was replaced. Stations 11 to 14 were checked. The original plan was worked until sundown. However, the crew stopped working at around 3:00 p.m., to prepare for the dozer tire replacement. Placing of riprap was expected to be finished on Monday.

Materials used/Volume: 1731.74 tons of riprap delivered by barge.

A-E Signature

11/21/98
Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Fri 11/20/98
Time In: 8:00 am Time Out: 8:30 pm

Description of site visit: It was a rainy and windy day. Because south waterside anchor was not grabbing very well, the deck engineer had a hard time controlling the derrick at the south end. Therefore, the derrick was moved to the north end to start placing riprap. I was going to measure the water depth and OK the elevation without writting down the measurement (to save time). However, Phil Wallace of General Construction requested me to do the final measurement on the riprap. I told him that might take longer, because I don't have an assistant. He had no problem with it. So I proceeded to write down the measurement. To approve a station, I relied on the riprap elevation profile and the tide elevation that was provided by General Construction. I calculated the maximum allowable water depth by adding the tide to the riprap elevation, and adjusted for the leadline cut (the lead was tied at 4 feet). If the actual measurement is less than the maximum allowable, the station is approved. If it came out short on a spot, I would inform the skiff operator. He would then radio the crane operator for more rocks. I would then re-measure the spot until enough elevation built up. The derrick crews were told to clean up a barge worth of rocks before quitting. We worked late. Stations 1 to 10 were approved before the end of the day. Station 11 was finished, but not measured due to heavy wind and wave.

Materials used/Volume: 1477.84 tons of riprap delivered by barge.

A-E Signature

11/20/98
Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: 11-19-98
Time In: 7:30 AM Time Out: 4:00 PM

Description of site visit: 7:30A - Arrived on site. Placement of rock on waterway bottom, 1 FT Lifts. Measured depths are an average of 1 FT. higher than plan grade. All data recorded for depths at each station from sheetpile to 70FT. at 10 FT. intervals. Drove sheetpiles on south end of wall.

Materials used/Volume: 1¼ minus drain rock, for waterway bedding.

Chris Barnes
A-E Signature

11-19-98
Date

Copy to:

Berger/ABAM Engineers Inc.
Daily Field Report

Project: GUNITE STEEL
Date: 11/18/98
Time In: 8:30 AM Time Out: 1:30 PM

Description of site visit: MONITORING THE PLACEMENT OF BALIST FOR THE BERM. BALIST IS COMPRISED OF ROCK BETWEEN 12" MINUS AND MOSTLY 6" MINUS. THE BALIST WAS PLACED USING A BARGE CRANE.

TALKED WITH PHIL WALLACE ABOUT HEIGHT OF BERM. HE SAID: THE BERM HEIGHT WILL BE BETWEEN 6' & 8' HIGH.

TOOK SOUNDING AT STA 7-11 BERM WAS BETWEEN 6' & 8' IN HEIGHT.

Materials used/Volume: ~~N/A~~ 1945.45 tons of riprap delievered by barge

A-E Signature 11/18/98 Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Tue 11/17/98
Time In: 8:30 am Time Out: 4:30 pm

Description of site visit: Several activities occurred simultaneously. Sheet piles were driven at the south end and the first layer of sand and gravel, for the cap, are being placed at the north end. Phil Wallace promised me that I'd be able to finish off the preconstruction leadline survey at the south end by afternoon. The minimum depth of sand and gravel was 1 foot. I received the station profiles from General Construction based on the elevation data I submitted earlier. General Construction wants me to OK the cap thickness before they move onto the next station. To speed up the process, I opted for calculating the maximum post sand and gravel depth, rather than finding out the post sand and gravel elevation. To calculate the maximum "post sand and grave" depth, I took the tide elevation, added the bottom elevation (which is always less than zero elevation) and subtracted the required sand and gravel thickness (which is at least 1 foot thick). If the actual leadline measurements were less than the maximum depth, I Oked the station. The measurement was not written down, it would be formally recorded on the actual post-construction survey. In between approving stations, I finished the preconstruction leadline at the south end. The measurement will be given to General Construction on 11/18. I told Phil Wallace that I have jury duty on Wednesday and Thursday. Someone from BERGER/ABAM would take my place for the few days.

Materials used/Volume: 1503 tons of sand and gravel delivered by barge.

A-E Signature

11/17/98
Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Mon 11/16/98
Time In: 8:00 am Time Out: 3:00 pm

Description of site visit: Performed cap placement survey today. A few buckets of rock were placed at the north end return wall. The berm is being built today. The original scope calls for BERGER/ABAM to perform a leadline survey before cap placement started, then another leadline survey after the cap is in place, but before the pile driving; then the third leadline survey after all the steel and prestressed concrete piles are driven. However, Phil Wallace of General Construction wanted BERGER/ABAM to do a continuous monitoring during cap placement. Knowing that will substantially increase the effort by BERGER/ABAM, I informed Darrell Joque and Arnie Rusten of BERGER/ABAM, who then got authorization from Dennis Griffith of Schniter Steel to approve my continuous presence. However, Schniter does not wish to pay a second person on the monitoring program. Because I don't have an assistant, I'll have to take note and perform the measurement at the same time. It will slow down the process somewhat, but not impossible. The placement of the berm was performed, starting at late morning. To determine the thickness of the berm, water depths were measured at the berm location. 50' of berm was built for the first day. It consistently took three buckets of rock at each location to build the berm. Phil Wallace of General Construction and I agree I probably don't need to monitor the berm building continuously.

Materials used/Volume: No New material delievered.

A-E Signature

11/16/98
Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Fri 11/13/98
Time In: 1:00 pm Time Out: 3:00 pm

Description of site visit: Performed leadline survey for three additional stations, at the request of Phil Wallace of General Construction. Persons involved in the survey included Matt Bollinger and Frank Yang, from BERGER/ABAM, and the operator of the skiff from General Construction. It was raining but the water remained calm. Measurements of the leadline survey were taken at 10-ft intervals from the sheet pile to the toe of berm. To adjust for the tidal effect, the tide levels were measured at the beginning and the end of each station. The result of the survey is appended to the survey done of Wed 10/11/98. General Construction brought in a barge worth of riprap for the Monday morning toe placement. The barge line interfered with the survey. At three locations, I have had to move the survey locations by a foot, in order to avoid the barge lines. There are also two sheet piles that haven't been driven to elevation that is interfering with the surveying. The station is moved to accommodate the sheet piles. Station 11 is 24' south of station 10, Station 12 is 20' south of Station 11, and Station 13 is 29' south of Station 12.

Materials used/Volume: 1446.2 tons riprap delivered by barge (see barge ticket No. 748).

Frank Yang
A-E Signature

11/13/98
Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Wed 11/11/98
Time In: 8:00 am Time Out: 12:00 pm

Description of site visit: Leadline survey was performed. By Wednesday morning, General Construction managed to delineate 10 stations, starting from the north end of the project. Persons involved in the survey included Chris Barnes and Frank Yang, from BERGER/ABAM, and the operator of the skiff from General Construction. To ensure the repeatability of the survey, the first three stations were each surveyed twice.

Measurements of the leadline survey were taken at 10-ft intervals from the sheet pile to the toe of berm. To adjust for the tidal effect, the tide levels were measured at the beginning and the end of each station. The result of the survey is attached. The survey result was good. Of the 27 points that repeated, only 4 points vary more than 0.5' and all points stay within a 1' range.

Materials used/Volume: NA

Frank Yang
A-E Signature

11/11/98
Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Tue 11/10/98
Time In: 3:00 pm Time Out: 3:30 pm

Description of site visit: The purpose of the visit was to confirm the availability of equipment from General Construction, for the Wednesday, 10/11/98, morning's leadline survey. All necessary equipment was in place.

Materials used/Volume: NA

A-E Signature

11/10/98
Date

Copy to:

BERGER/ABAM Engineers Inc.
Daily Field Report

Project: Schnitzer Steel
Date: Mon 11/9/98
Time In: 9:30 am Time Out: 2:00 pm

Description of site visit: Monitor the installation of filter fabric. The fabric is made of lightweight floatable material, therefore, it requires weight to hold it down. The installation process was as follows. The filter fabric came in a 15-foot-wide roll. One end of the filter fabric is clamped onto the sheet pile wall. The fabric is then held down by sandbags placed by a diver. Several sandbags are placed next to the sheet pile wall and various intermediate locations to prevent floating. The visibility into the waterway was poor, therefore the operation could not be observed from land. However, judging from the installation method, the filter fabric installation should be satisfactory.

Materials used/Volume: NA

A-E Signature

11/9/98
Date

Copy to:

APPENDIX D
DIVERS REPORTS

GLOBAL
Diving & Salvage, Incorporated

Schnitzer Steel
1902 Marine View Drive
Tacoma, WA 98422
Attn: Rick Buse

Re: Final Letter of Condition

This letter is to report the final condition of the seabed under the Schnitzer Steel Dock located on the Hylebos Waterway.

On Friday, January 22, 1999, Global Diving & Salvage, Inc. performed an underwater survey of the above referenced structure. The purpose of the dive was to asses the final condition of the rip rap cover. Surface supplied dive gear was utilized, with topside to diver two-way communications. Visibility at the time of the dive was good at ~15'. The dive was conducted from the face of the dock from a 26' aluminum dive support vessel. The following is a report of the diver's findings:

The bottom is completely covered with riprap, with no evidence of the geotextile fabric evident. There were no uncovered areas visible. There is no debris evident. There is no evidence of contamination of any kind. The diver inspected the entire length of the dock.

Submitted without prejudice,

FOR
Daniel Gilchrist
Inspecting Diver

3840 -West Marginal Way S.W. Seattle,Washington 98106 24 hours a day - 206-623-0621 E-Mail: gdiving@aol.com FAX: 206-932-9036

APPENDIX E
MATERIALS

White Cap®
HARDWARE, TOOLS & MATERIALS

FROM- O R D E R ... N O. [illegible]
WHITE CAP INDUSTRIES INC
[illegible] 6TH AVE
206.783.8400
SEATTLE, WA. 9810?

SOLD TO: 0451000
GENERAL CONSTRUCTION CO
P O BOX 2450?
SEATTLE WA 98124-0000

SHIP TO:
SCHNITZER STEEL
1902 MARINE VIEW DR.
TACOMA WA 9842?
JOB#
253-314-6000

ORDER NO	ORDER DATE	INVOICE DATE	JOB NO.	CUSTOMER P.O.NO	SLSMN
181653	10/21/98	10/22/98	0451004	6565-80747	4603

TERMS	SHIP VIA/ROUTING	DATE REQUESTED	SHIPPED	LOC	TAKEN BY
ET 30 DAY	OUR TRUCK			46	46BXN

LN	PART NUMBER / DESCRIPTION	QTY ORD	U/M	QTY SHP	QTY BKO	PRICE / SHIP UNITS	U/M	AMOUNT / DISC%
10	30001454501 AMOCO,4545 15'X300'500 SY/ROLL	13	ROL	13	0	[redacted]		
20	SHIPPING SE SHIPPING AND HANDLING	1		1	0	[redacted]		

INVOICE AMOUNT

SIGN
PRINT PHIL WALLACE

"FOR YOUR CONVENIENCE
WHITE CAP'S SUMMER STORE HOURS
WILL BE M - F 6AM - 5PM
SAT 8AM - 12NOON, SUN CLOSED."
PHOENIX, AZ HOURS M - F 5AM - 5PM
SAT 8AM - 12NOON

ES ON NON STOCK MERCHANDISE

PACKING SLIP

BARGE TICKET

No. 748

LONE STAR NORTHWEST

Expect More From Us . . . We Deliver!

MATS MATS QUARRY

360 Quarry Road • Port Ludlow, WA 98365

(360) 437-2211 • 764-3021 • Fax (360) 437-0350

Consigned To: General Const

Ordered By: PHIL WALLACE

Order # SCHMITZER

Date NOV 11/98

Barge 6C/103

Tug

MATERIAL LOAD ✓ OFF LOAD

PRODUCT NO.	DESCRIPTION	AMOUNT ORDERED	AMOUNT LOADED
			TONS
7350	LIFT GATE ASSEMBLY ATTACHED		1446.2 TONS
			TONS
			TONS

	PORT		STARBOARD
D 4'11"	R		R D 3'2"
D 2'3"	R	WATER LINE-LOADED	R D 1'8"
D 4'2"	R	WATER LINE-LIGHT	R D 3'5"
D 1'5"	R		R D 1'0"

TONNAGE USING CARGO DEADWEIGHT TABLE

	FREEBOARD	TONS
LOADED	1'3'75	1634.68
LIGHT	7.25	188.48
NET		1446.2

SIGNED

OFFICE USE ONLY

TONS

PRICE

AMOUNT

JWS TICKET NO.

LS-152M 11/97

No. 751

LONE STAR NORTHWEST
Expect More From Us . . . We Deliver!

MATS MATS QUARRY
360 Quarry Road • Port Ludlow, WA 98365
(360) 437-2211 • 764-3021 • Fax (360) 437-0350

Consigned To: General

Date Nov 17/98

Barge GC 105

Ordered By:

Tug Esther

Order # Schnitzer

MATERIAL LOAD V OFF LOAD

PRODUCT NO.	DESCRIPTION	AMOUNT ORDERED	AMOUNT LOADED
			TONS
7330	R.F R.F.		1495.45 TONS
			TONS
			TONS

PORT			STARBOARD
D 8 5" R		R	D 7' 11"
D 14' 11" R	WATER LINE-LOADED	R	D 14' 11"
D 9' 1" R	WATER LINE-LIGHT	R	D 8' 2"
D 11' 11" R		R	D 11' 11"

TONNAGE USING CARGO DEADWEIGHT TABLE

	FREEBOARD	TONS
LOADED	1.05	1718.98
LIGHT	7.10	223.53
NET		1495.45

SIGNED

OFFICE USE ONLY

TONS

PRICE

AMOUNT

JWS TICKET NO.

S-152M 11/97

BARGE TICKET

No. 753

LONE STAR NORTHWEST

Expect More From Us . . . We Deliver!

MATS MATS QUARRY

360 Quarry Road • Port Ludlow, WA 98365
(360) 437-2211 • 764-3021 • Fax (360) 437-0350

Consigned To: Concrete Const

Date Nov 19/98

Barge GC 103

Ordered By: Phil.

Tug

Order # Schmitzer

MATERIAL LOAD ✓ OFF LOAD

PRODUCT NO.	DESCRIPTION	AMOUNT ORDERED	AMOUNT LOADED
7330	RIPRAP		1477.84 TONS
			TONS
			TONS
			TONS

PORT			STARBOARD	
D 88	R		R	D 84
D 18	R	WATER LINE-LOADED	R	D 16
D 90	R	WATER LINE-LIGHT	R	D 86
D 14	R		R	D 12

TONNAGE USING CARGO DEADWEIGHT TABLE

	FREEBOARD	TONS
LOADED	1.25	1667.22
LIGHT	7.25	189.38
NET		1477.84

SIGNED

OFFICE USE ONLY

TONS

PRICE

AMOUNT

JWS TICKET NO.

LS-152M 11/97

LONE STAR NORTHWEST
STEILACOOM PLANT

6320 Grandview Dr. W. • Tacoma, WA 98467
Tacoma (206) 564-1911
Seattle Line (206) 764-3080
"The Only Producer of Quality Steilacoom Aggregates"

DATE		TIME
/24/98	NOT RESPONSIBLE FOR DAMAGE CAUSED BY DELIVERY INSIDE CURB LINE.	12:04

OMER ID	LSN ORDER NO.	CUSTOMER P.O. NUMBER	TICKET NUMBER
50	DEL	6565-85923	84737

	DELIVERED TO:
ERAL CONSTRUCTION CO (SEA BOX 24506 TTLE, WA 98124	1902 MARINE VIEW DRIVE GATE D AT OLD GEN METAL YARD.

E PRICE TOTAL

TAX

IRONMENTAL FEE TOTAL COST

E

ST CODE	PRODUCT DESCRIPTION
M	4 BY 8 QUARRY SPALLS WEIGHMASTER

NO.	HAULER DESCRIPTION
	WALRATH TRUCKING

ICK NO.	CUSTOMER TRUCK NO.	LOADS TODAY	TONS TODAY
7	#27 WALRATH	1	33.16

IAME	PLANT NO.	WEIGHTS
ILACOOM PIT	100	NET TON : 33.16

IO.	DRIVER ON OFF	
360		NET LBS : 66320 TARE LBS : 40040 GROSS LBS : 106360

D BY:

LONE STAR NORTHWEST
STEILACOOM PLANT

6320 Grandview Dr. W. • Tacoma, WA 98467
Tacoma (206) 564-1911
Seattle Line (206) 764-3080
"The Only Producer of Quality Steilacoom Aggregates"

DATE		TIME
11/24/98	NOT RESPONSIBLE FOR DAMAGE CAUSED BY DELIVERY INSIDE CURB LINE.	12:17

CUSTOMER ID	LSN ORDER NO.	CUSTOMER P.O. NUMBER	TICKET NUMBER
26850	DEL	6565-85923	84738

SOLD TO:	DELIVERED TO:
GENERAL CONSTRUCTION CO (SEA P O BOX 24506 SEATTLE, WA 98124	1902 MARINE VIEW DRIVE GATE D AT OLD GEN METAL YARD

TYPE PRICE TOTAL

MTL. TAX

FRT.

ENVIRONMENTAL FEE TOTAL COST

ZONE

PRODUCT CODE	PRODUCT DESCRIPTION
8510	4 BY 8 QUARRY SPALLS WEIGHMASTER

HAULER NO.	HAULER DESCRIPTION
702	WALRATH TRUCKING

LSN TRUCK NO.	CUSTOMER TRUCK NO.	LOADS TODAY	TONS TODAY
2623	WALRATH	1	63.72

PLANT NAME	PLANT NO.	WEIGHTS
STEILACOOM PIT	100	NET TON : 32.56

SCALE NO.	DRIVER ON OFF	
105240		NET LBS : 65120 TARE LBS : 40120 GROSS LBS : 105240

RECEIVED BY:

LONE STAR NORTHWEST
STEILACOOM PLANT
6320 Grandview Dr. W. • Tacoma, WA 98467
Tacoma (206) 564-1911
Seattle Line (206) 764-3080
"The Only Producer of Quality Steilacoom Aggregates"

DATE		TIME
/24/98	NOT RESPONSIBLE FOR DAMAGE CAUSED BY DELIVERY INSIDE CURB LINE.	13:35

OMER ID	LSN ORDER NO.	CUSTOMER P.O. NUMBER	TICKET NUMBER
50	DEL	6563-85923	84741

):
ERAL CONSTRUCTION CO (SEA
BOX 24506
TTLE, WA 98124

DELIVERED TO:
1902 MARINE VIEW DRIVE
GATE D AT OLD GEN METAL
YARD

E PRICE TOTAL
TAX
IRONMENTAL FEE
TOTAL COST

T CODE	PRODUCT DESCRIPTION	
8	4 BY 8 QUARRY SPALLS	WEIGHMASTER

NO.	HAULER DESCRIPTION
	WALRATH TRUCKING

CK NO.	CUSTOMER TRUCK NO.	LOADS TODAY	TONS TODAY
	#27 WALRATH	3	98.39

AME	PLANT NO.
LACOOM PIT	100

O.	DRIVER ON OFF
80	

BY:

WEIGHTS
NET TON : 32.67
NET LBS : 65340
TARE LBS : 40040
GROSS LBS : 105380

LONE STAR NORTHWEST
STEILACOOM PLANT
6320 Grandview Dr. W. • Tacoma, WA 98467
Tacoma (206) 564-1911
Seattle Line (206) 764-3080
"The Only Producer of Quality Steilacoom Aggregates"

DATE		TIME
11/24/98	NOT RESPONSIBLE FOR DAMAGE CAUSED BY DELIVERY INSIDE CURB LINE.	13:39

CUSTOMER ID	LSN ORDER NO.	CUSTOMER P.O. NUMBER	TICKET NUMBER
26850	DEL	6565-85923	84742

SOLD TO:
GENERAL CONSTRUCTION CO (SEA
P O BOX 24506
SEATTLE, WA 98124

DELIVERED TO:
1902 MARINE VIEW DRIVE
GATE D AT OLD GEN METAL
YARD.

TYPE PRICE TOTAL
MTL.
FRT.
ENVIRONMENTAL FEE
ZONE
TAX
TOTAL COST

PRODUCT CODE	PRODUCT DESCRIPTION	
8510	4 BY 8 QUARRY SPALLS	WEIGHMASTER

HAULER NO.	HAULER DESCRIPTION
702	WALRATH TRUCKING

LSN TRUCK NO.	CUSTOMER TRUCK NO.	LOADS TODAY	TONS TODAY
2623	WALRATH	4	130.84

PLANT NAME	PLANT NO.
STEILACOOM PIT	100

SCALE NO.	DRIVER ON OFF
105020	

RECEIVED BY:

WEIGHTS
NET TON : 32.45
NET LBS : 64900
TARE LBS : 40120
GROSS LBS : 105020

LONE STAR NORTHWEST, INC.

Trucking Loading Schedule

DUPONT

Load Date: 11/16/00 Time: 12:00 Time: _____

Hauler: 998

Barge #: DPT 27
26,850 GENERAL

Order: _____

P.O. Number: _____

Post-it Fax Note 7671 | Date 12/2 | # of pages 4
To PHIL WALLACE
Fax #
From LONE STAR
Phone #

Ticket #	Product	Ordered	Loaded
902393	7421 (FOR 7420)	1500	1503

Load Number: 2107

Comments:

Pioneer Aggregates
Office Number: (206) 912-8500

P.O. Box 509

DuPont, WA 98327
Fax Number: (206) 912-8510

LONE STAR NORTHWEST, INC.

Todays Loading Schedule — DUPONT

Load Date: 11/19/02

Hauler: 998

Barge #: DPT 27

Customer: ZENON

Order: SCHNITZER

P.O. Number: _____

Ticket #	Product	Ordered	Loaded
010421	7421	750	750
_____	7421	750	749
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

> 11/99

Load Number: 2118

Comments:

Pioneer Aggregates
Office Number: (206) 912-8500

P.O. Box 509

DuPont, WA 98327
Fax Number: (206) 912-8510

...EST, INC.

Trilogy Loading Schedule — DUPONT

Load Date: 11/21 Time: 2:30 Offload Date: 11/25

Hauler: _____

Barge #: GC103

Customer: Quinault

Order: _____

P.O. Number: _____

Ticket #	Product	Ordered	Loaded	
9A2477	7491	750	563	
9A2478	7495	750	607	← FIS Roc

Load Number: 9A136

Comments: 2136

Pioneer Aggregates
Office Number: (206) 912-6300
P.O. Box 509
DuPont, WA 98327
Fax Number: (206) 912-6540

JAN- [illegible] THU 1:49 PM LONESTAR FAX NO. [illegible]

DELIVERY TICKET NO: 085366

LONE STAR NORTHWEST
STEILACOOM PLANT

6320 Grandview Dr. W. • Tacoma, WA 98467
Tacoma (206) 564-1911
Seattle Line (206) 784-3080
"The Only Producer of Quality Steilacoom Aggregates"

DATE		TIME
01/06/99	NOT RESPONSIBLE FOR DAMAGE CAUSED BY DELIVERY INSIDE CURB LINE.	09:56

CUSTOMER ID	LSN ORDER NO.	CUSTOMER P.O. NUMBER	TICKET NUMBER
26850	DEL	6565-85923	85366

SOLD TO:	DELIVERED TO:
GENERAL CONSTRUCTION CO (SEA P O BOX 24506 SEATTLE, WA 98124	1902 MARINE VIEW DRIVE GATE D AT OLD GEN METAL YARD

TYPE PRICE TOTAL
MTL. TAX
FRT.
ENVIRONMENTAL FEE TOTAL COST
ZONE

PRODUCT CODE	PRODUCT DESCRIPTION	
8518	4 BY 8 QUARRY SPALLS	WEIGHMASTER

HAULER NO.	HAULER DESCRIPTION
702	WALRATH TRUCKING

LSN TRUCK NO.	CUSTOMER TRUCK NO.	LOADS TODAY	TONS TODAY
2623	#23 WALRATH	1	34.85

PLANT NAME	PLANT NO.	WEIGHTS
STEILACOOM PIT	180	NET TON : 34.85
SCALE NO.	DRIVER ON OFF	NET LBS : 69700
8		TARE LBS : 40120
RECEIVED BY:		GROSS LBS : 109820
*	Thank You	

APPENDIX F
SURVEY DATA

Station #1								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 6.2	- 3.7	0	- 1.8	1.9	0	- 1.4	2.3
10	- 6.9	- 4.4	10	- 2.9	1.5	10	- 3.0	1.4
20	-10.2	- 8.2	20	- 7.2	1.0	20	- 6.4	1.8
30	-13.2	-11.2	30	- 9.3	2.0	30	- 9.8	1.4
40	-16.2	-14.2	40	-13.4	0.8	40	-14.2	0.0
50	-23.0	-21.0	50	-18.5	2.5	50	-18.2	2.8
60	-28.9	-26.9	60	-20.5	6.4	60	-21.1	5.8
70	-31.2	-29.2	70	-25.1	4.1	70	-24.4	4.8
80	-35.2		80	-31.6		80	-29.3	

Station #2								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 4.4	- 1.9	0	- 1.0	0.9	0	- 2.4	- 0.5
10	- 5.9	- 3.4	10	- 3.1	0.3	10	- 3.2	0.2
20	-10.1	- 8.1	20	- 7.1	1.0	20	- 6.9	1.2
30	-14.7	-12.7	30	- 9.3	3.4	30	- 9.2	3.5
40	-15.3	-13.3	40	-13.0	0.3	40	-13.6	- 0.3
50	-20.0	-18.0	50	-16.6	1.4	50	-18.1	- 0.1
60	-28.7	-26.7	60	-20.8	5.9	60	-21.7	5.0
70	-33.4	-31.4	70	-27.5	3.9	70	-24.6	6.8
80	-35.8		80	-33.7		80	-30.4	

Station #3								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 4.7	- 2.2	0	- 1.3	0.9	0	- 2.1	0.1
10	- 6.9	- 4.4	10	- 3.7	0.8	10	- 4.4	0.0
20	-12.8	-10.8	20	- 6.6	4.2	20	- 5.6	5.2
30	-14.8	-12.8	30	-10.9	1.9	30	-10.2	2.7
40	-15.2	-13.2	40	-13.1	0.2	40	-13.6	- 0.4
50	-20.3	-18.3	50	-16.1	2.2	50	-17.2	1.2
60	-27.2	-25.2	60	-21.4	3.8	60	-21.8	3.4
70	-32.5	-30.5	70	-25.3	5.2	70	-26.8	3.8
80	-36.7		80	-32.5		80	-33.3	

Station #4								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 5.7	- 3.2	0	- 1.7	1.5	0	- 3.5	- 0.3
10	-10.2	- 7.7	10	- 4.8	2.9	10	- 5.4	2.3
20	-13.1	-11.1	20	- 8.9	2.2	20	- 8.2	2.9
30	-16.3	-14.3	30	-12.9	1.4	30	-13.0	1.3
40	-18.7	-16.7	40	-16.0	0.7	40	-16.6	0.1
50	-23.8	-21.8	50	-20.4	1.4	50	-20.2	1.6
60	-30.3	-28.3	60	-25.4	2.9	60	-24.0	4.3
70	-32.1	-30.1	70	-28.0	2.1	70	-28.5	1.6
80	-35.6		80	-35.9		80	-32.9	

Station #5								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 9.3	- 6.8	0	- 4.3	2.5	0	- 4.9	1.9
10	-11.2	- 8.7	10	- 6.3	2.5	10	- 6.7	2.0
20	-14.0	-12.0	20	- 9.5	2.5	20	- 8.4	3.6
30	-16.2	-14.2	30	-12.0	2.2	30	-12.8	1.4
40	-19.5	-17.5	40	-16.4	1.1	40	-16.9	0.6
50	-24.3	-22.3	50	-20.1	2.2	50	-20.2	2.1
60	-28.4	-26.4	60	-23.2	3.2	60	-24.9	1.5
70	-34.5	-32.5	70	-27.6	4.9	70	-30.0	2.5
80	-36.7		80	-32.4		80	-34.8	

Station #6								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 7.7	- 5.2	0	- 3.5	1.7	0	- 4.9	0.3
10	-12.0	- 9.5	10	- 7.4	2.1	10	- 7.4	2.1
20	-15.9	-13.9	20	-10.8	3.1	20	- 9.3	4.6
30	-16.4	-14.4	30	-11.9	2.5	30	-10.8	3.6
40	-18.5	-16.5	40	-15.8	0.8	40	-16.5	0.1
50	-22.4	-20.4	50	-18.3	2.1	50	-19.4	1.0
60	-29.8	-27.8	60	-23.5	4.3	60	-24.7	3.1
70	-32.8	-30.8	70	-28.5	2.3	70	-28.6	2.2
80	-36.7		80	-37.8		80	-35.5	

Station #7								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 7.1	- 4.6	0	- 3.7	0.9	0	- 4.6	0.0
10	-11.5	- 9.0	10	- 7.3	1.7	10	- 7.4	1.7
20	-15.8	-13.8	20	-12.0	1.8	20	-10.2	3.6
30	-18.5	-16.5	30	-15.8	0.8	30	-14.6	2.0
40	-20.4	-18.4	40	-17.1	1.3	40	-18.9	- 0.5
50	-23.9	-21.9	50	-21.1	0.8	50	-21.4	0.5
60	-27.2	-25.2	60	-23.8	1.4	60	-25.7	- 0.5
70	-33.9	-31.9	70	-30.4	1.5	70	-29.6	2.3
80	-36.1		80	-36.5		80	-34.4	

Station #8								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 8.2	- 5.7	0	- 3.9	1.9	0	- 4.0	1.7
10	-10.6	- 8.1	10	- 6.0	2.1	10	- 6.9	1.2
20	-14.1	-12.1	20	-11.0	1.2	20	- 8.8	3.3
30	-16.8	-14.8	30	-14.0	0.9	30	-12.8	2.0
40	-20.6	-18.6	40	-17.6	1.0	40	-16.9	1.8
50	-25.8	-23.8	50	-22.1	1.8	50	-21.9	1.9
60	-29.5	-27.5	60	-25.9	1.6	60	-26.9	0.6
70	-33.0	-31.0	70	-29.8	1.3	70	-30.8	0.2
80	-37.5		80	-35.5		80	-36.2	

Station #9								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 7.1	- 4.6	0	- 2.8	1.8	0	- 3.8	0.8
10	- 8.3	- 5.8	10	- 4.3	1.5	10	- 5.2	0.6
20	-13.6	-11.6	20	-10.3	1.3	20	- 8.5	3.1
30	-18.9	-16.9	30	-14.0	2.9	30	-14.1	2.8
40	-20.6	-18.6	40	-17.7	1.0	40	-17.4	1.3
50	-24.8	-22.8	50	-20.3	2.5	50	-21.5	1.3
60	-32.4	-30.4	60	-26.3	4.1	60	-24.8	5.6
70	-33.9	-31.9	70	-30.6	1.3	70	-31.6	0.3
80	-36.7		80	-37.3		80	-36.4	

Station #10								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 4.6	- 2.1	0	- 0.4	1.7	0	- 0.6	1.5
10	- 6.1	- 3.6	10	- 2.8	0.8	10	- 3.7	- 0.1
20	-12.2	-10.2	20	-10.0	0.2	20	- 6.5	3.7
30	-18.6	-16.6	30	-12.9	3.7	30	-12.1	4.5
40	-20.7	-18.7	40	-18.4	0.3	40	-18.7	0.0
50	-25.6	-23.6	50	-22.9	0.7	50	-24.0	- 0.4
60	-29.7	-27.7	60	-26.2	1.5	60	-25.5	2.2
70	-34.5	-32.5	70	-31.0	1.5	70	-29.4	3.1
80	-37.5		80	-36.8		80	-35.9	

Station #11								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 1.5	1.0	0	1.2	0.2	0	1.4	0.4
10	- 6.5	- 4.0	10	- 3.7	0.3	10	- 4.2	- 0.2
20	-15.4	-13.4	20	- 8.9	4.5	20	- 8.3	5.1
30	-17.9	-15.9	30	-14.3	1.6	30	-13.9	2.0
41	-21.8	-19.8	40	-19.0	0.8	40	-19.0	0.8
50	-27.0	-25.0	50	-23.2	1.8	50	-22.8	2.2
60	-28.4	-26.4	60	-25.7	0.7	60	-26.6	- 0.2
70	-37.2	-35.2	70	-32.2	3.0	70	-30.7	4.5
80	-38.0		80	-37.3		80	-37.3	

Station #12								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 4.6	- 2.1	0	- 1.3	0.8	0	- 1.6	0.5
10	-10.9	- 8.4	10	- 4.3	4.1	10	- 4.4	4.0
20	-13.9	-11.9	20	- 9.5	2.4	20	- 7.5	4.4
30	-16.9	-14.9	30	-13.9	1.0	30	-13.5	1.4
40	-21.2	-19.2	40	-18.3	0.9	40	-19.1	0.1
51	-25.9	-23.9	50	-23.3	0.6	50	-23.0	0.9
61	-34.5	-32.5	60	-25.2	7.3	60	-26.9	5.6
70	-37.6	-35.6	70	-31.8	3.8	70	-32.2	3.4
80	-37.8		80	-36.8		80	-35.9	

Station #13								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 6.1	- 3.6	0	- 2.2	1.4	0	- 2.3	1.3
10	- 9.9	- 7.4	10	- 5.3	2.1	10	- 4.0	3.4
20	-14.1	-12.1	20	-10.5	1.6	20	- 7.8	4.3
30	-15.4	-13.4	30	-12.6	0.8	30	-13.3	0.1
40	-23.4	-21.4	40	-19.4	2.1	40	-19.6	1.9
50	-26.3	-24.3	50	-22.6	1.7	50	-21.2	3.1
60	-29.6	-27.6	60	-25.4	2.2	60	-24.3	3.3
70	-34.1	-32.1	70	-28.0	4.1	70	-29.9	2.2
80	-36.3		80	-36.2		80	-34.7	

Station #14								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 7.9	- 5.4	0	- 3.4	2.1	0	- 3.5	1.9
10	-12.1	- 9.6	10	- 6.9	2.8	10	- 7.6	2.0
20	-17.1	-15.1	20	-12.4	2.8	20	- 9.6	5.5
30	-19.2	-17.2	30	-15.1	2.1	30	-14.4	2.8
40	-21.3	-19.3	40	-18.6	0.7	40	-18.1	1.3
50	-26.3	-24.3	50	-22.6	1.7	50	-22.0	2.3
60	-31.0	-29.0	60	-23.8	5.3	60	-25.6	3.4
70	-36.2	-34.2	70	-27.3	6.9	70	-27.3	6.9
80	-38.1		80	-34.3		80	-33.7	

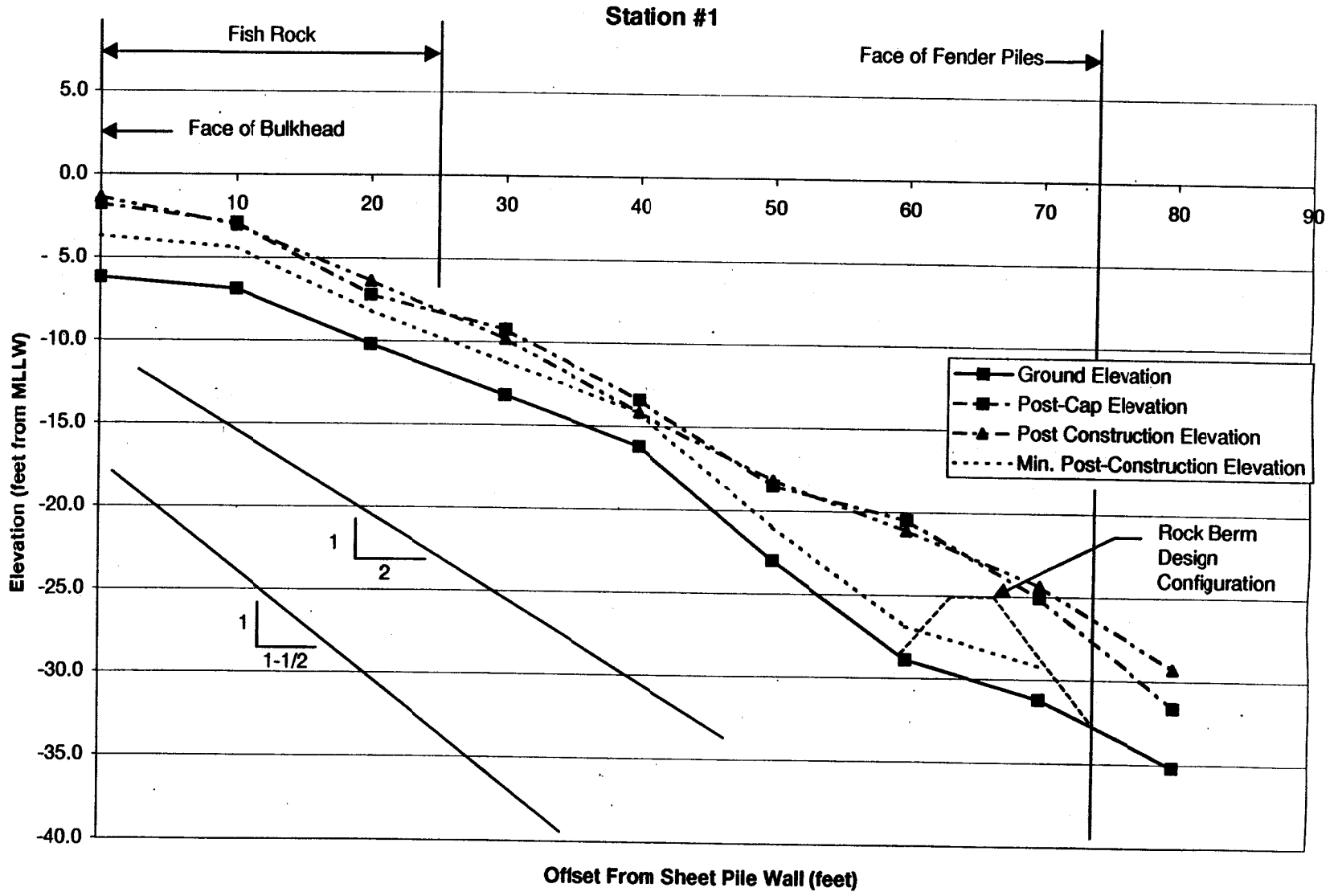
Station #15								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 6.0	- 3.5	0	- 2.5	1.1	0	- 2.4	1.1
10	- 9.7	- 7.2	10	- 5.0	2.2	10	- 5.1	2.1
20	-12.2	-10.2	20	- 9.3	0.9	20	- 8.3	2.0
30	-15.1	-13.1	30	-12.5	0.6	30	-13.1	- 0.0
40	-19.9	-17.9	40	-16.2	1.7	40	-16.3	1.6
50	-21.7	-19.7	50	-19.0	0.7	50	-18.1	1.6
60	-23.6	-21.6	60	-21.0	0.7	60	-22.1	- 0.5
70	-32.5	-30.5	70	-27.4	3.1	70	-27.3	3.2
80	-34.8		80	-33.9		80	-33.4	

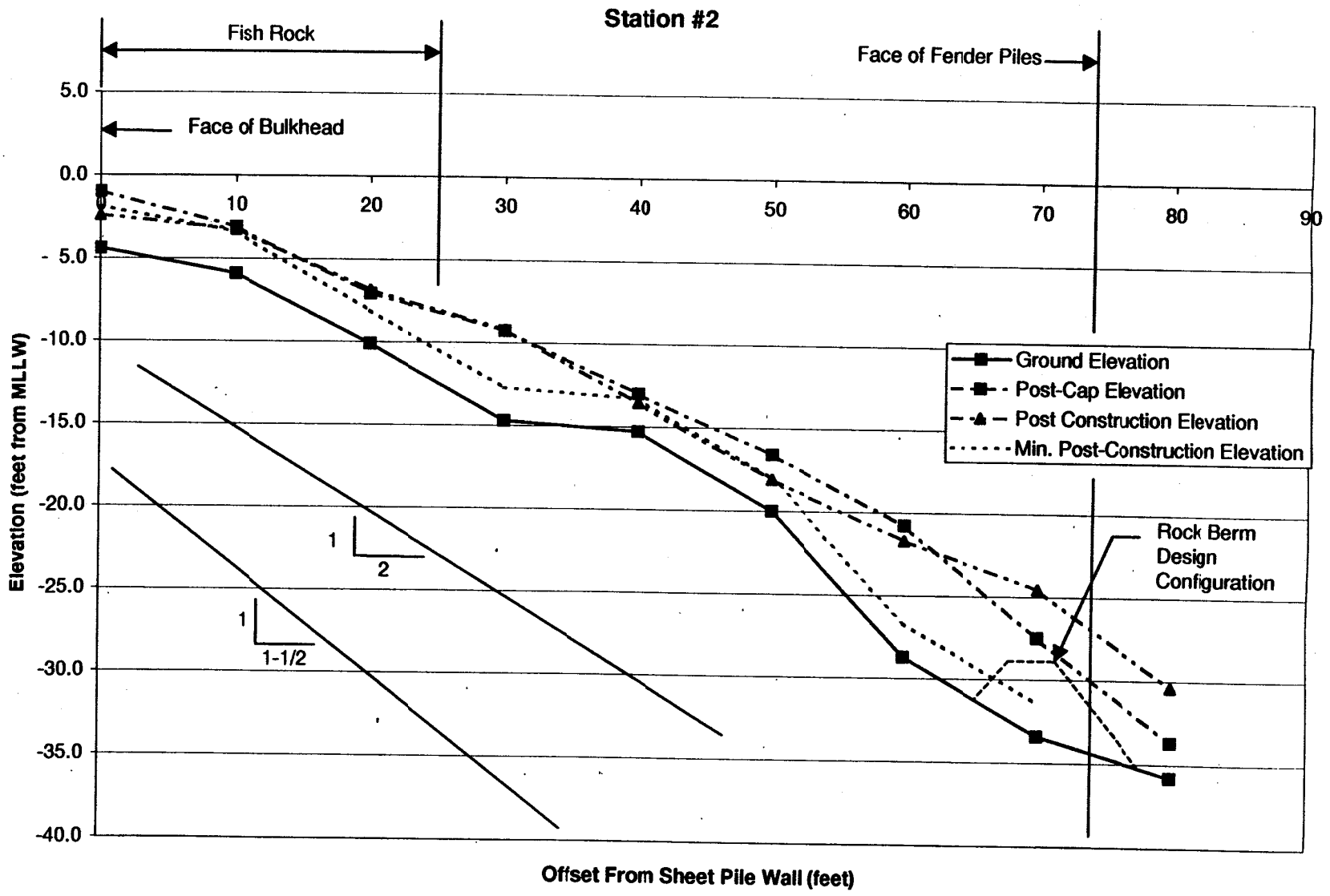
Station #16								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 6.8	- 4.3	0	- 2.4	2.0	0	- 0.6	3.7
10	-10.8	- 8.3	10	- 4.2	4.1	10	- 4.7	3.6
20	-13.5	-11.5	20	- 9.4	2.2	20	- 9.0	2.5
30	-18.5	-16.5	30	-14.7	1.8	30	-13.6	2.9
40	-21.9	-19.9	40	-17.0	2.9	40	-18.1	1.8
50	-23.4	-21.4	50	-19.6	1.8	50	-20.6	0.8
60	-27.5	-25.5	60	-23.5	2.0	60	-25.0	0.5
70	-34.8	-32.8	70	-29.5	3.3	70	-30.3	2.5
80	-36.6		80	-35.7		80	-35.6	

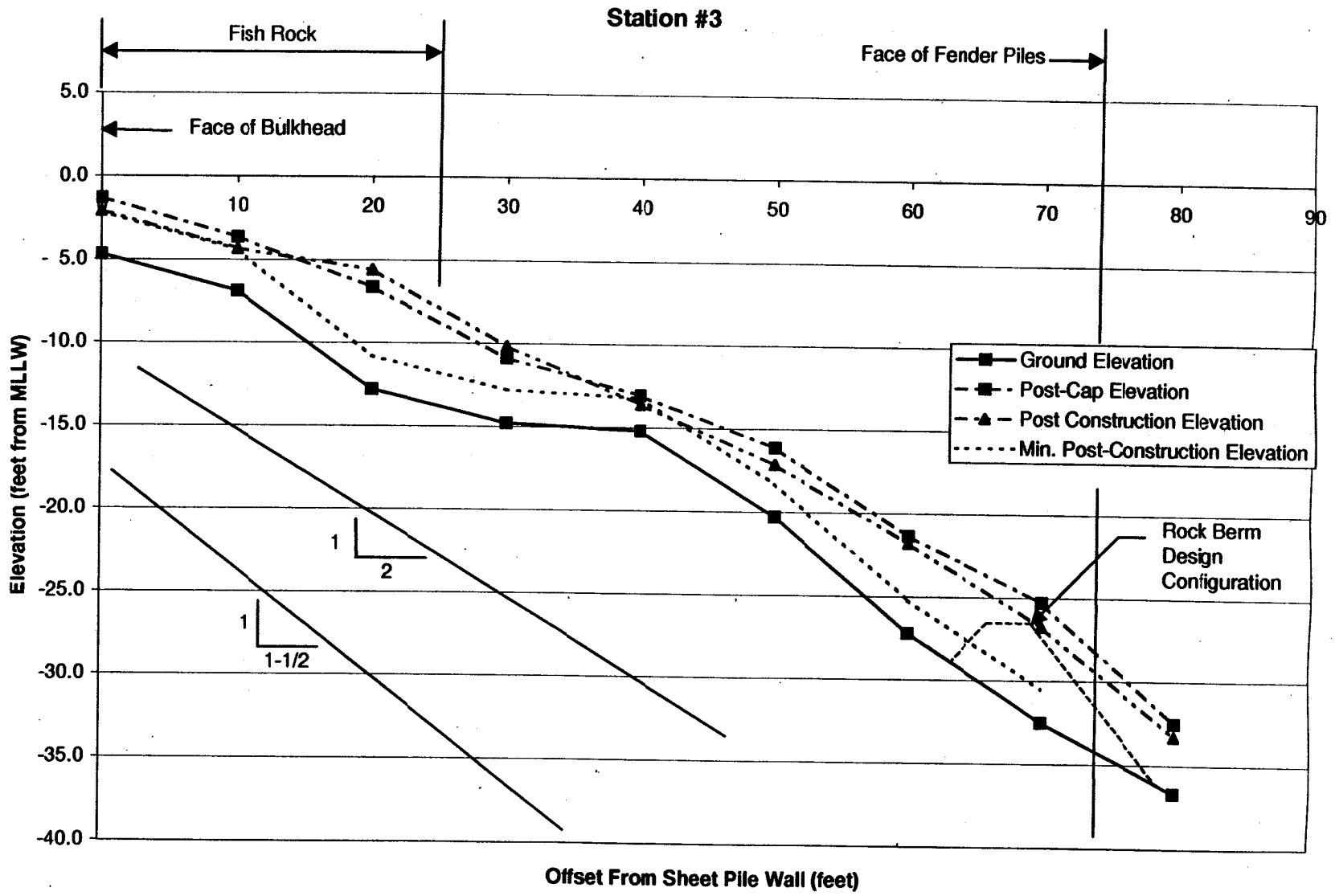
Station #17								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 6.2	- 3.7	0	- 0.4	3.3	0	- 0.6	3.1
10	- 7.1	- 4.6	10	- 1.7	2.9	10	- 2.6	2.0
20	-10.1	- 8.1	20	- 6.6	1.5	20	- 6.7	1.4
30	-13.5	-11.5	30	-11.2	0.3	30	-11.5	0.0
40	-20.7	-18.7	40	-16.5	2.3	40	-16.0	2.7
50	-25.9	-23.9	50	-20.4	3.5	50	-20.9	3.0
60	-32.7	-30.7	60	-25.0	5.7	60	-24.3	6.4
70	-36.2	-34.2	70	-31.0	3.2	70	-27.3	6.9
80	-38.6		80	-38.7		80	-34.4	

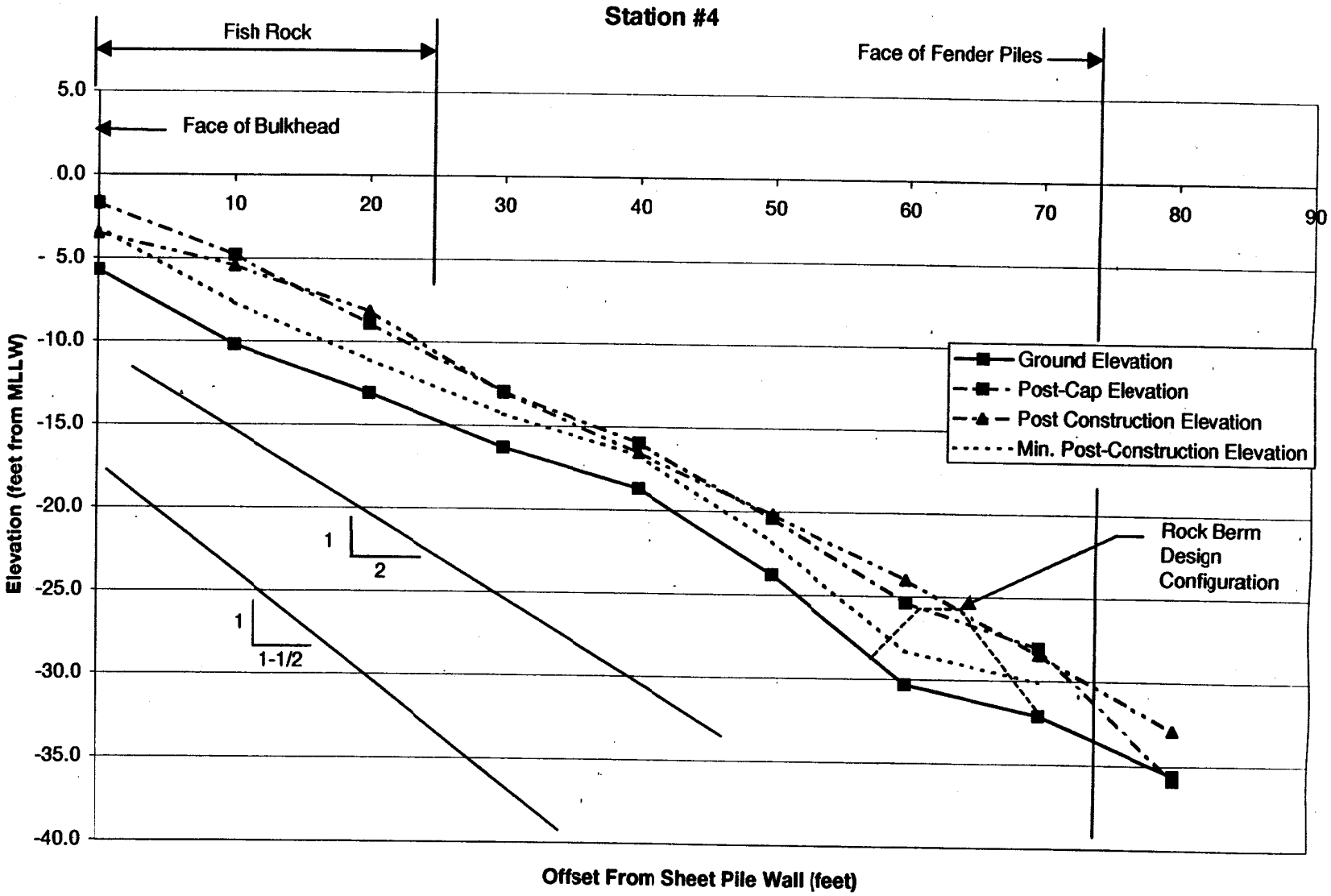
Station #18								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 4.0	- 1.5	0	- 0.3	1.3	0	1.0	2.5
10	- 8.0	- 5.5	10	- 2.5	3.0	10	- 2.7	2.9
20	-11.5	- 9.5	20	- 5.7	3.8	20	- 7.2	2.3
30	-16.5	-14.5	30	-13.3	1.2	30	-12.0	2.6
40	-22.8	-20.8	40	-19.0	1.8	40	-19.1	1.7
50	-27.0	-25.0	50	-22.3	2.7	50	-21.9	3.2
60	-35.0	-33.0	60	-23.2	9.8	60	-24.1	8.9
70	-37.0	-35.0	70	-28.4	6.6	70	-27.1	8.0
80	-37.5		80	-30.7		80	-33.6	

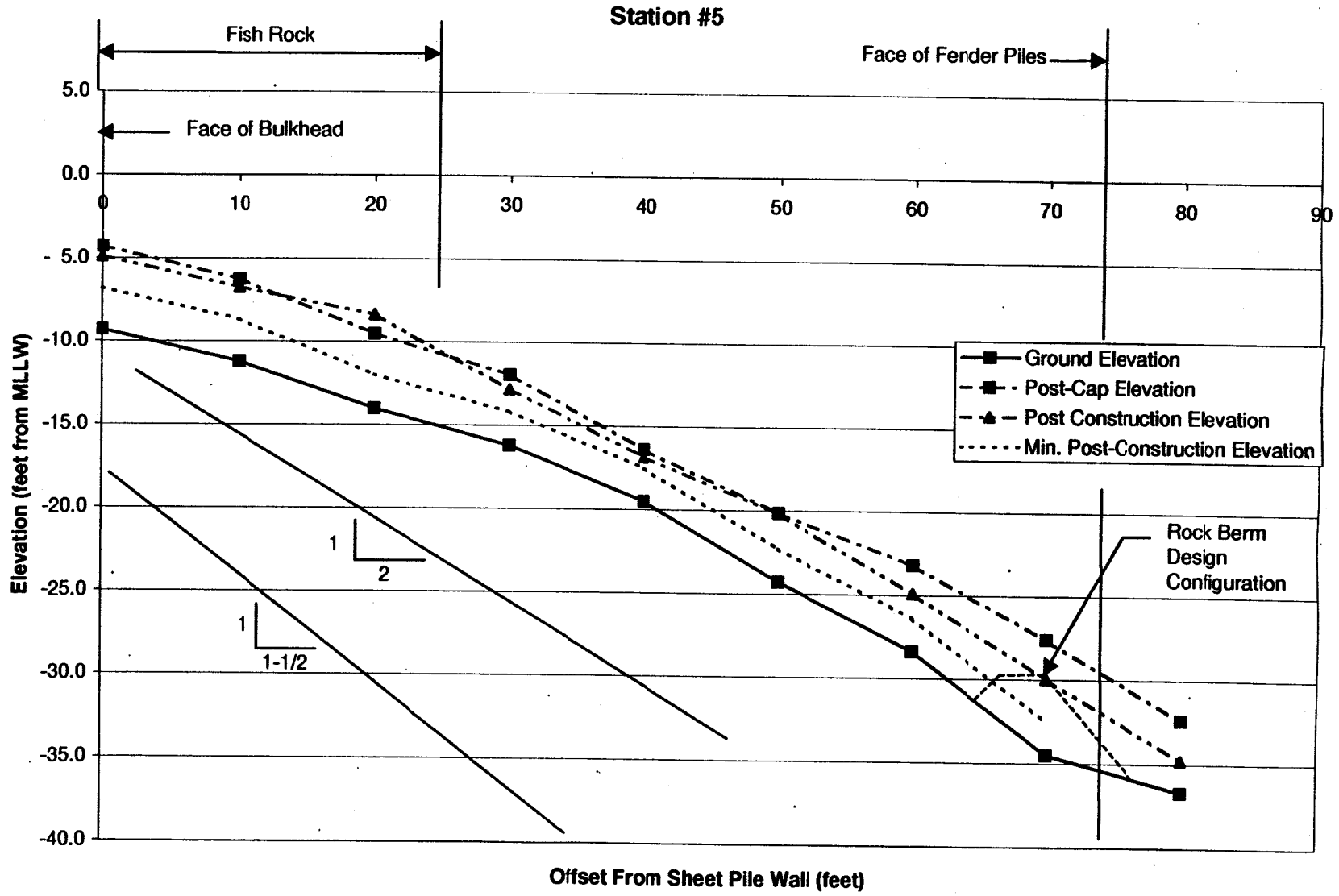
Station #19								
Pre Construction Elevation			Post-Cap Elevation			Post-Const. Elevation		
Dist	Measured	Req Final	Dist	Final	Hi / Lo	Dist	Final	Hi / Lo
0	- 4.1	- 1.6	0	- 1.2	0.4	0	- 0.7	0.9
10	- 8.5	- 6.0	10	- 4.9	1.1	10	- 5.5	0.5
20	-12.9	-10.9	20	- 9.8	1.2	20	- 7.5	3.4
30	-16.3	-14.3	30	-14.2	0.1	30	-12.3	2.1
40	-19.8	-17.8	40	-17.1	0.7	40	-15.6	2.2
50	-23.2	-21.2	50	-20.6	0.6	50	-21.4	- 0.1
60	-31.8	-29.8	60	-28.4	1.5	60	-26.6	3.2
70	-36.6	-34.6	70	-29.6	5.0	70	-27.7	7.0
80	-37.1		80	-36.6		80	-33.2	

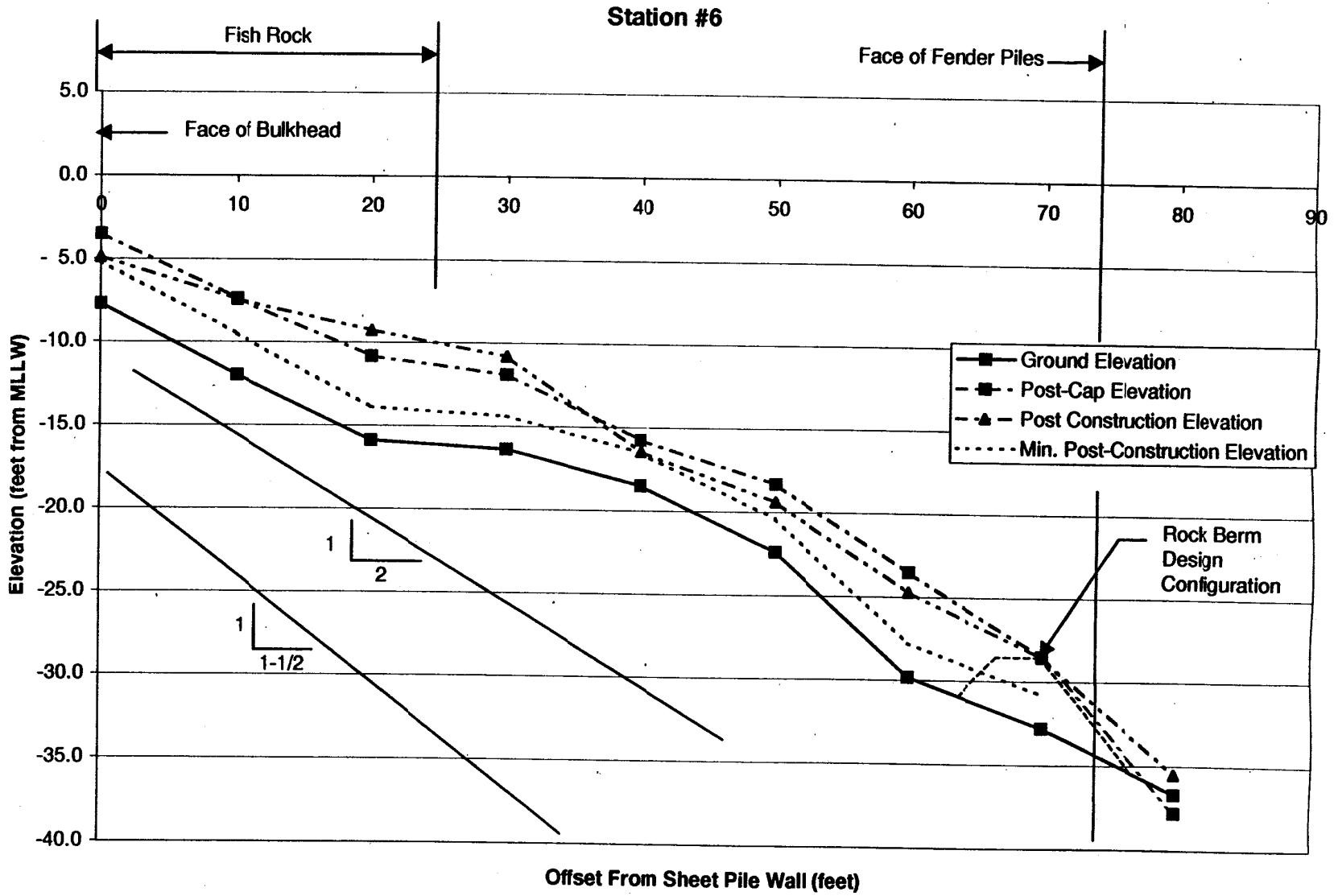

Station #1
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm
Design
Configuration
1
2
1
1-1/2

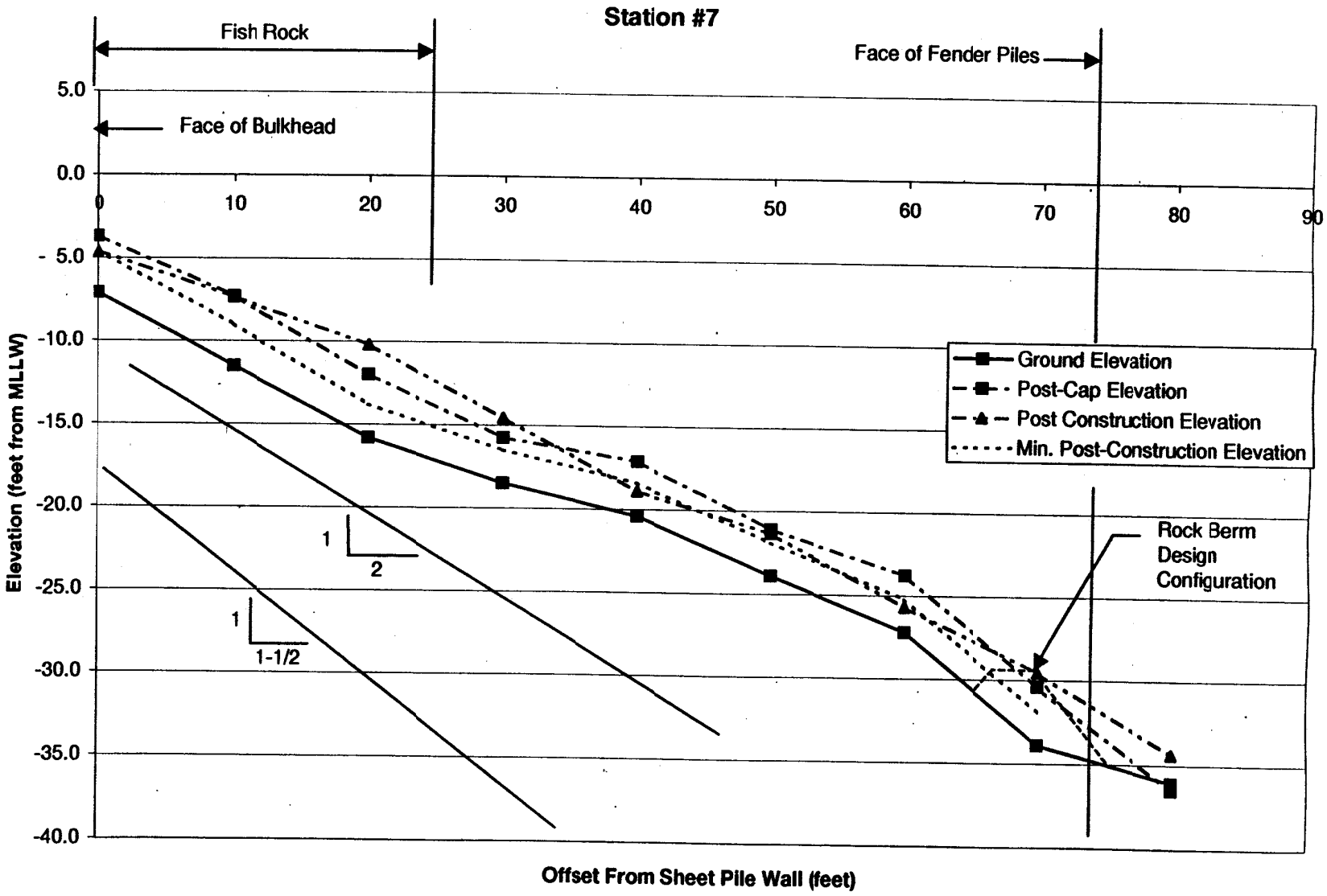

Station #2
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm
Design
Configuration
1
2
1
1-1/2

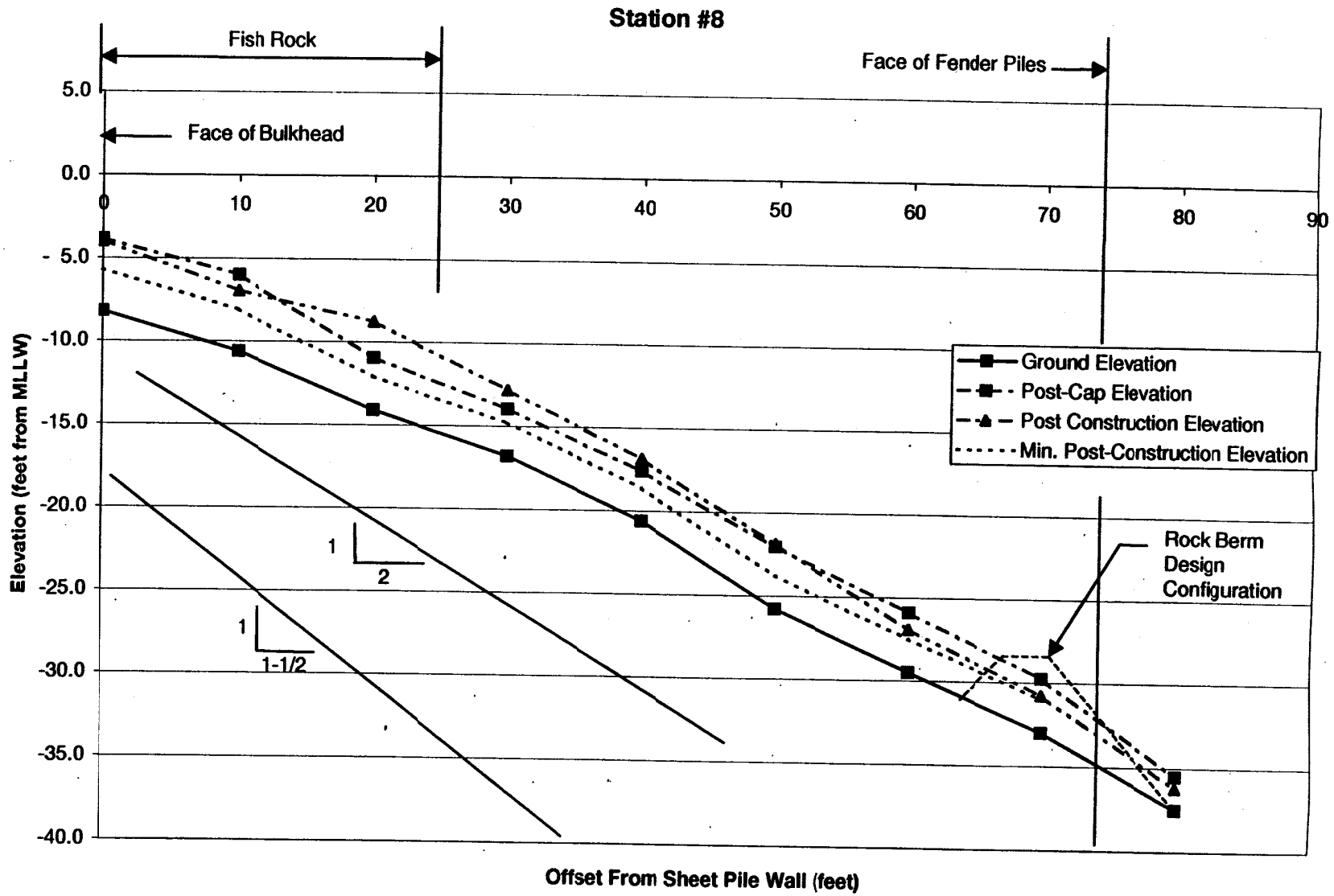

Station #3
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm Design Configuration
1
2
1
1-1/2

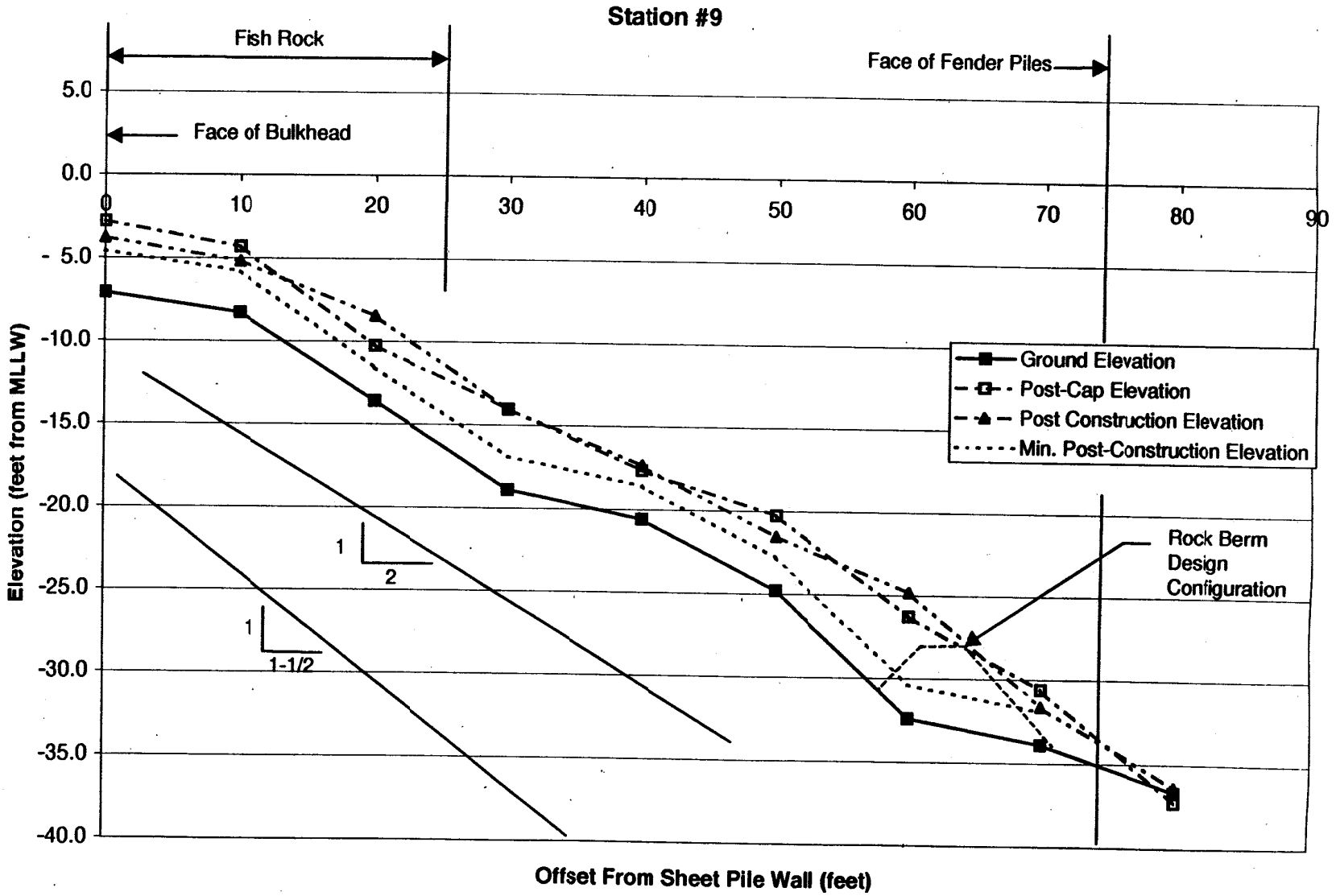

Station #4
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm
Design
Configuration
1
2
1
1-1/2

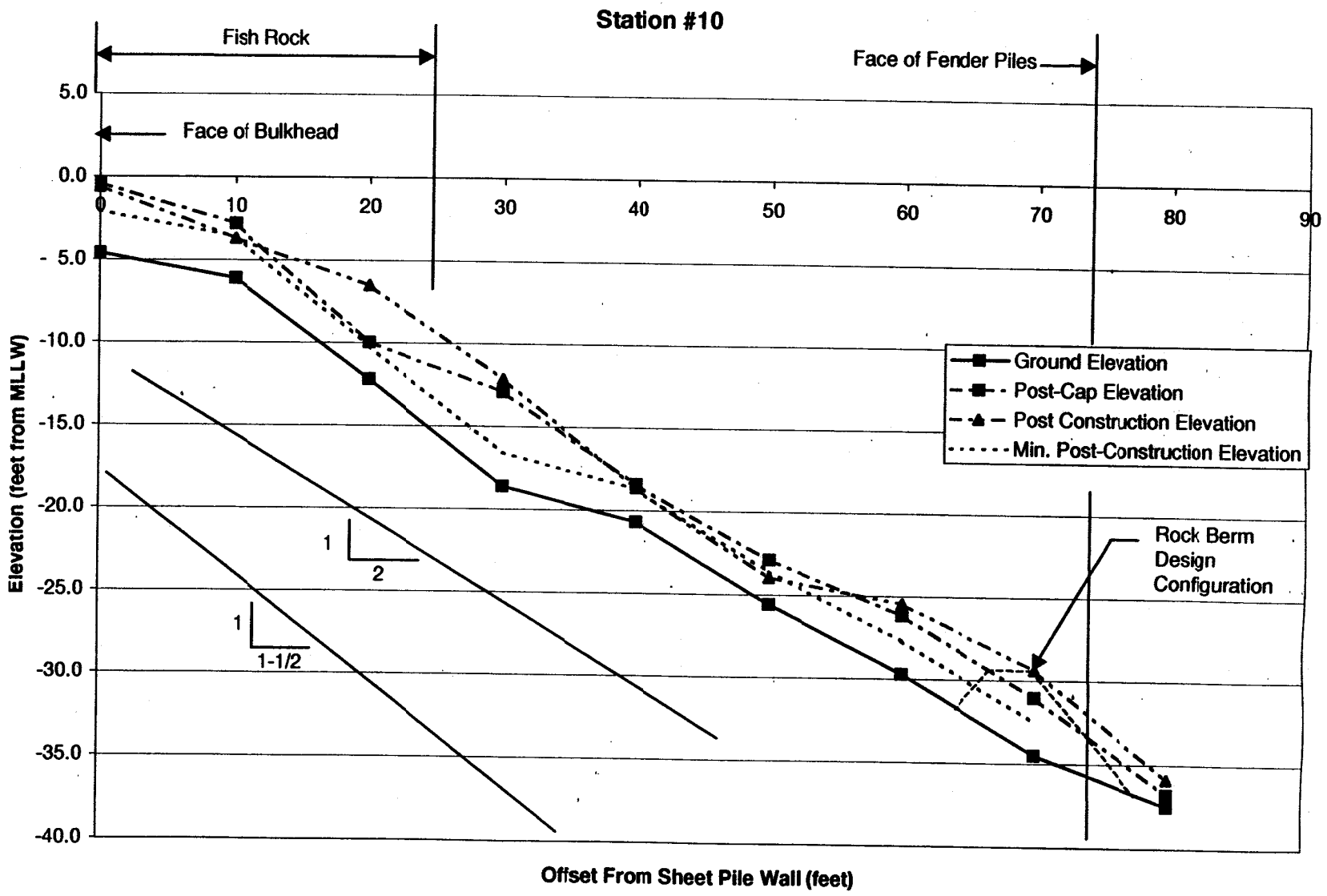

Station #5
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm Design Configuration
1
2
1
1-1/2

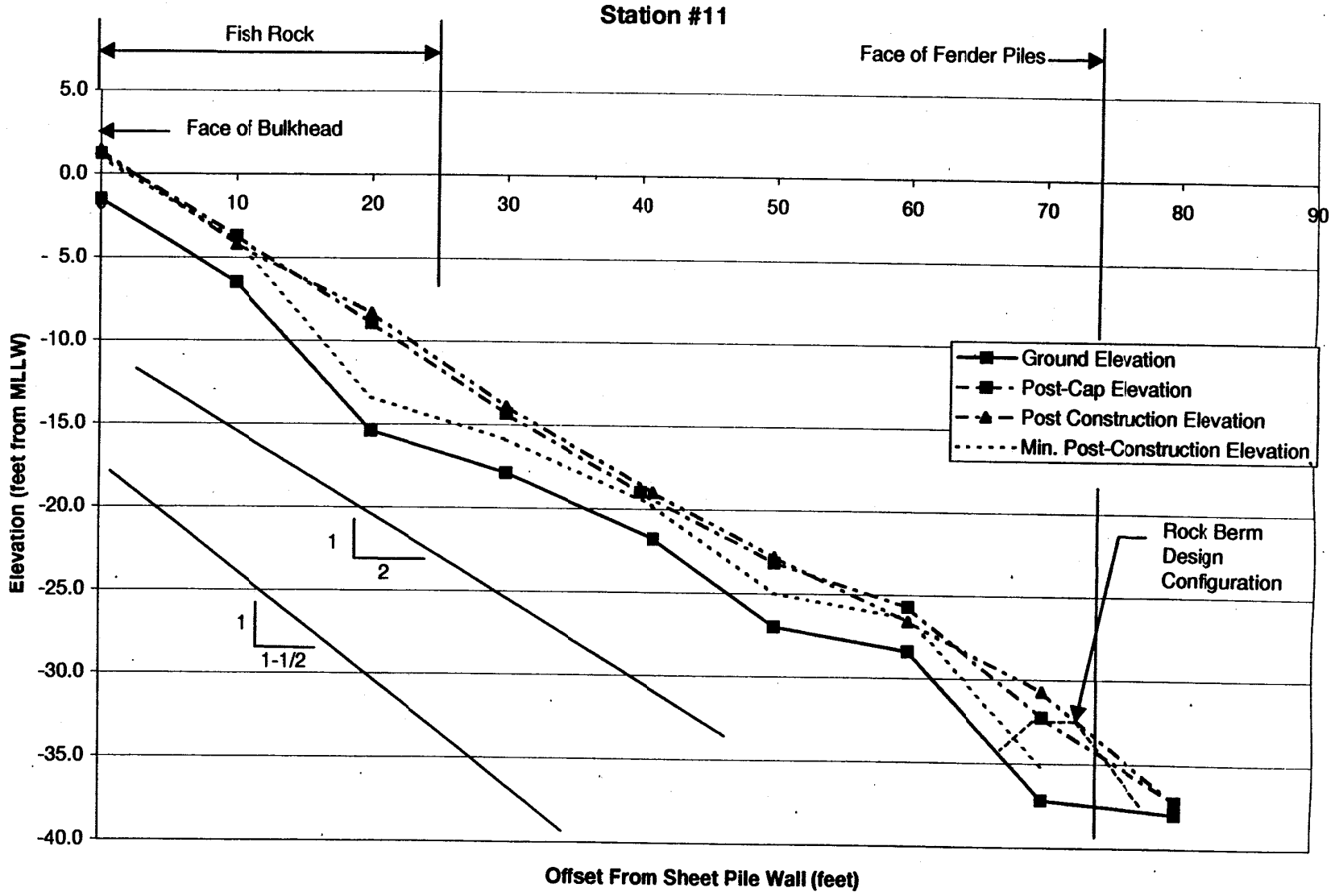

Station #6
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm
Design
Configuration
1
2
1
1-1/2

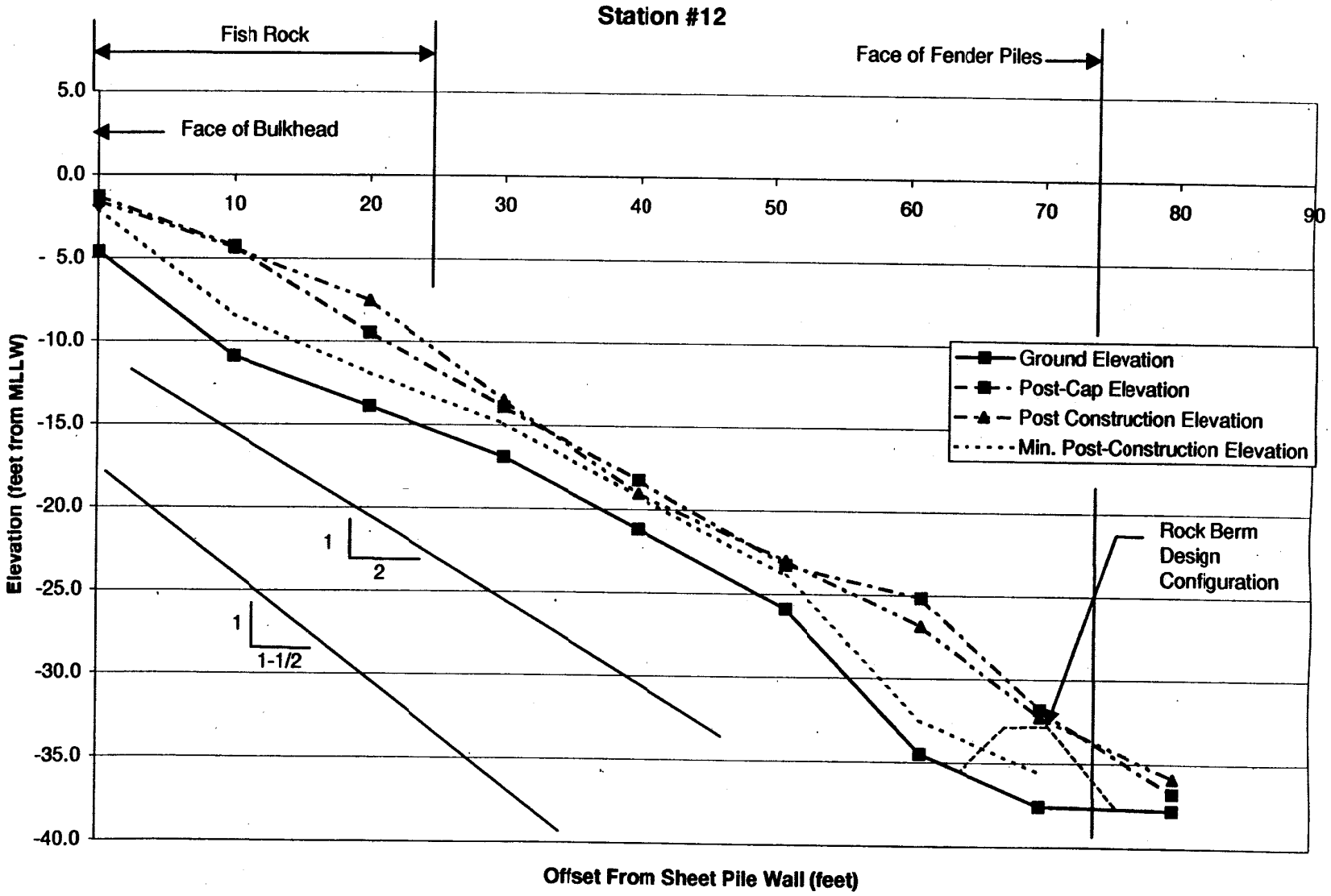

Station #7
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm
Design
Configuration
1
2
1
1-1/2

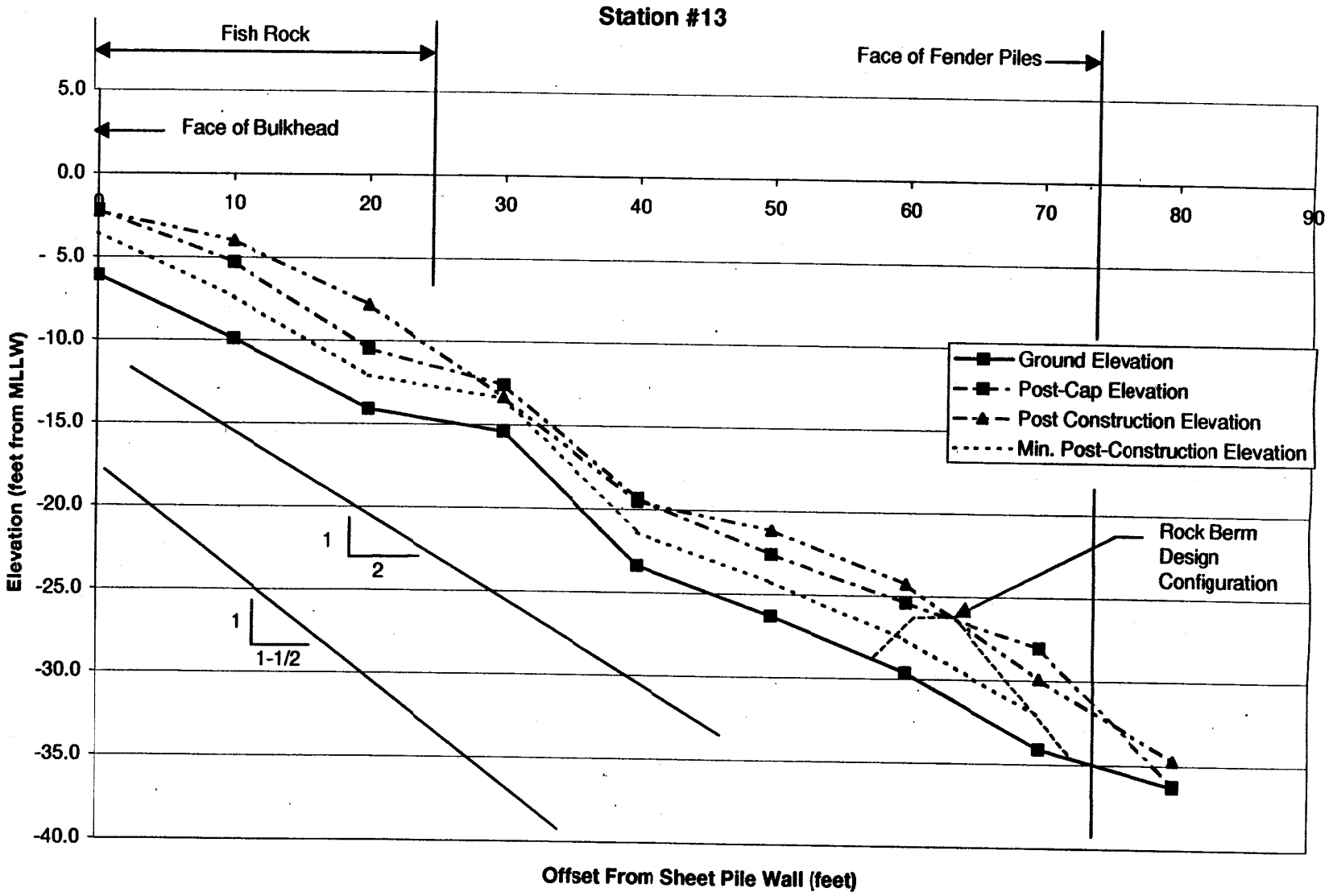

Station #8
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm
Design
Configuration
1
2
1
1-1/2

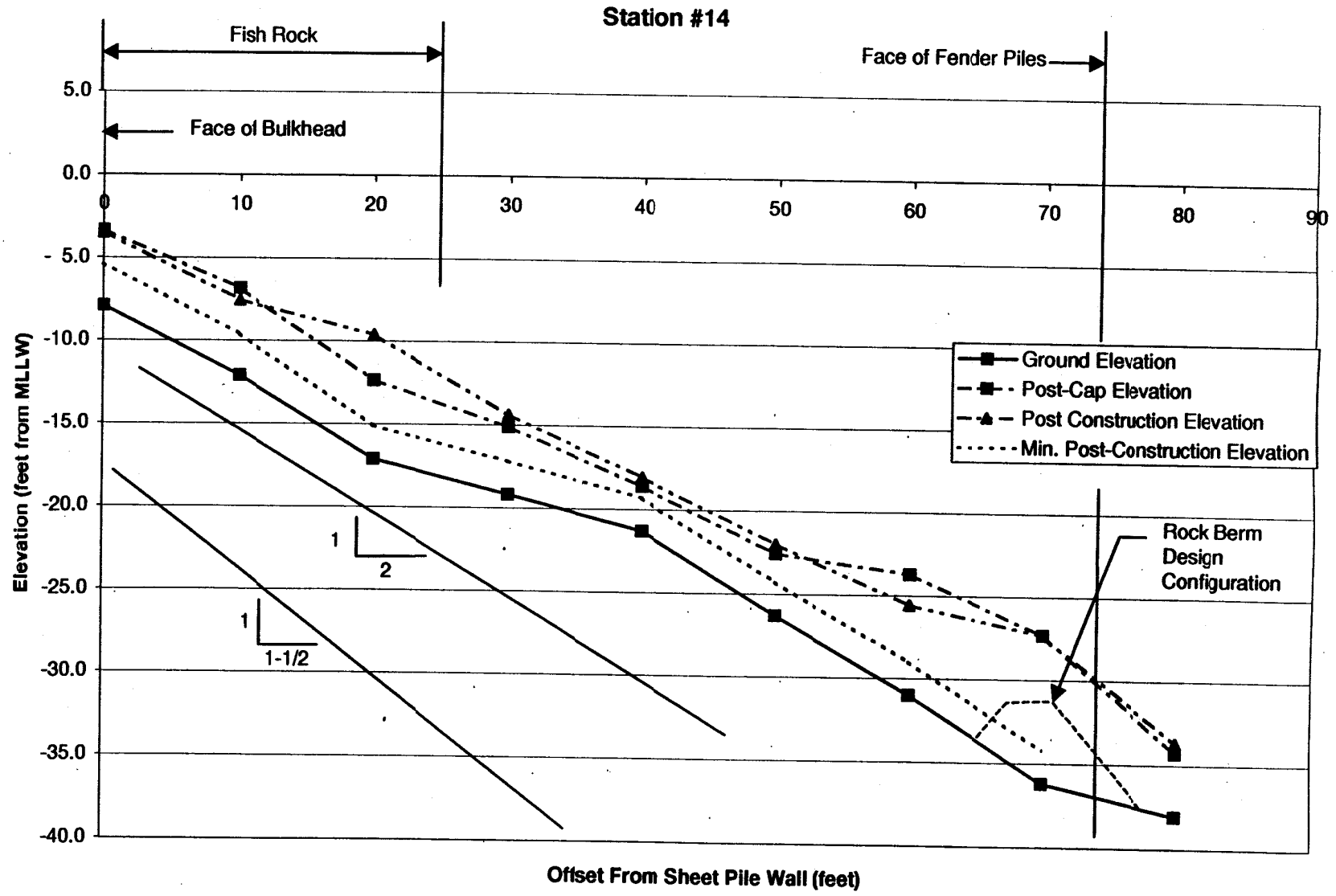

Station #9
Fish Rock
Face of Bulkhead
Face of Fender Piles
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm Design Configuration
1
2
1
1-1/2

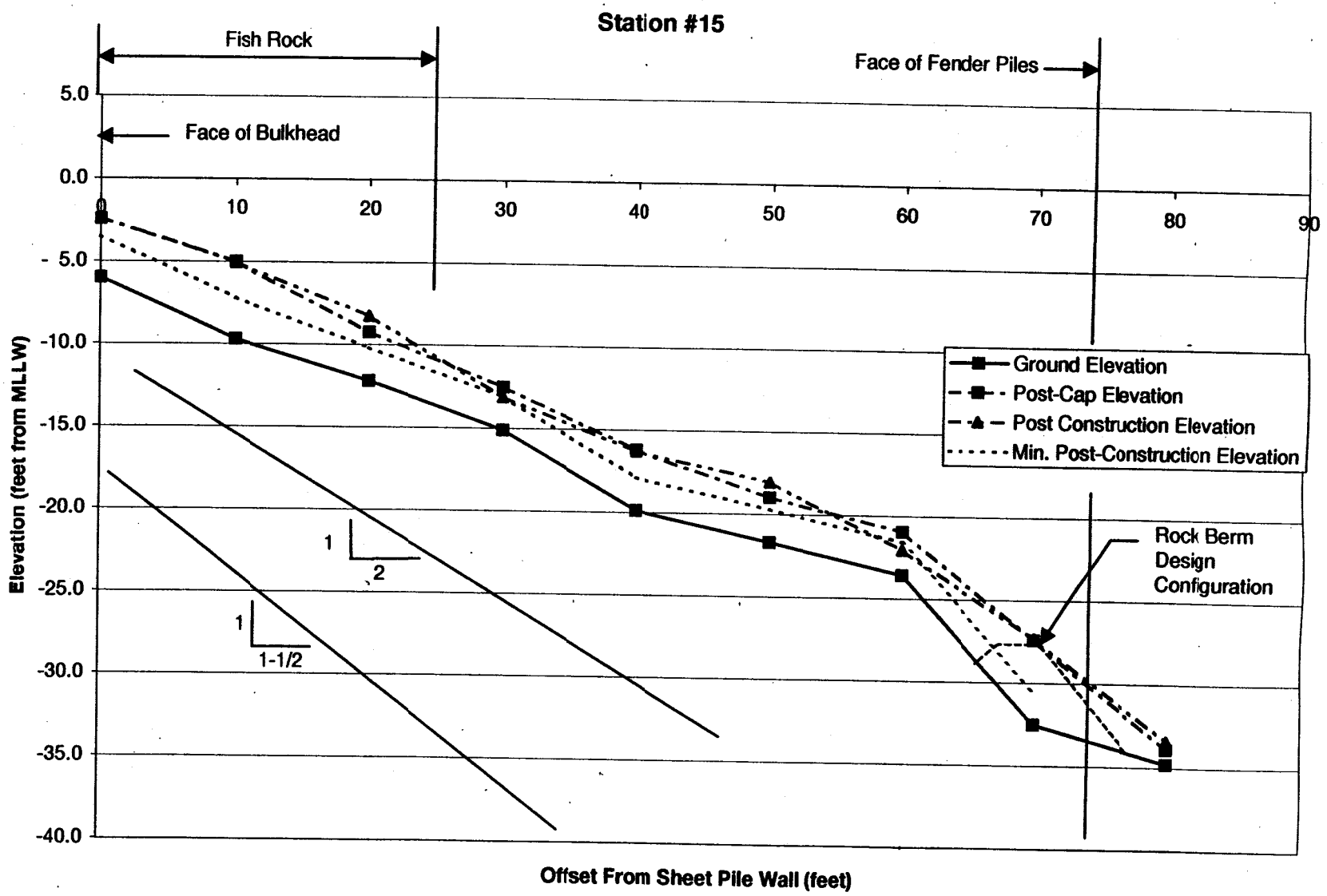

Station #10
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm
Design
Configuration
1
2
1
1-1/2

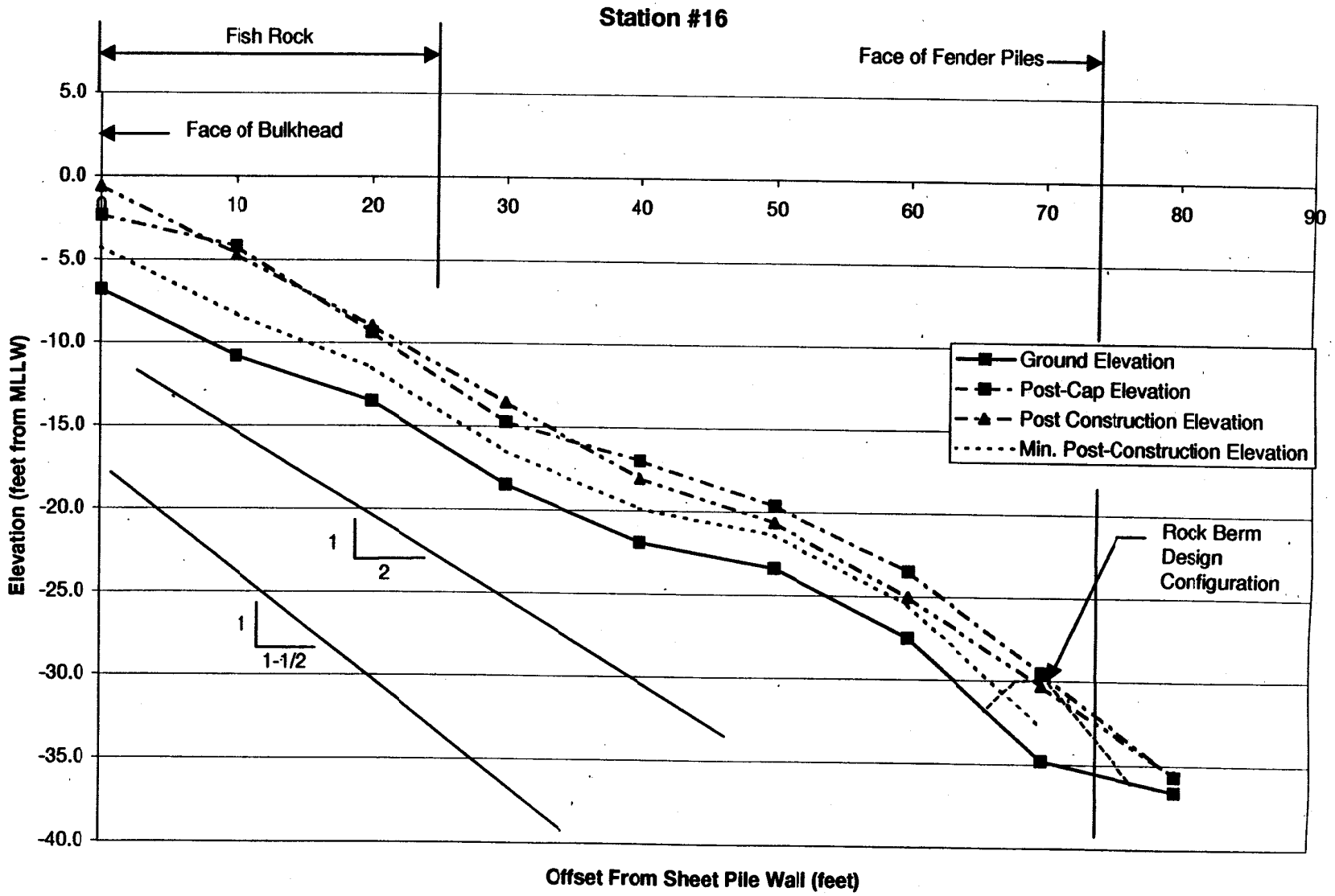

Station #11
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm Design Configuration
1
2
1
1-1/2

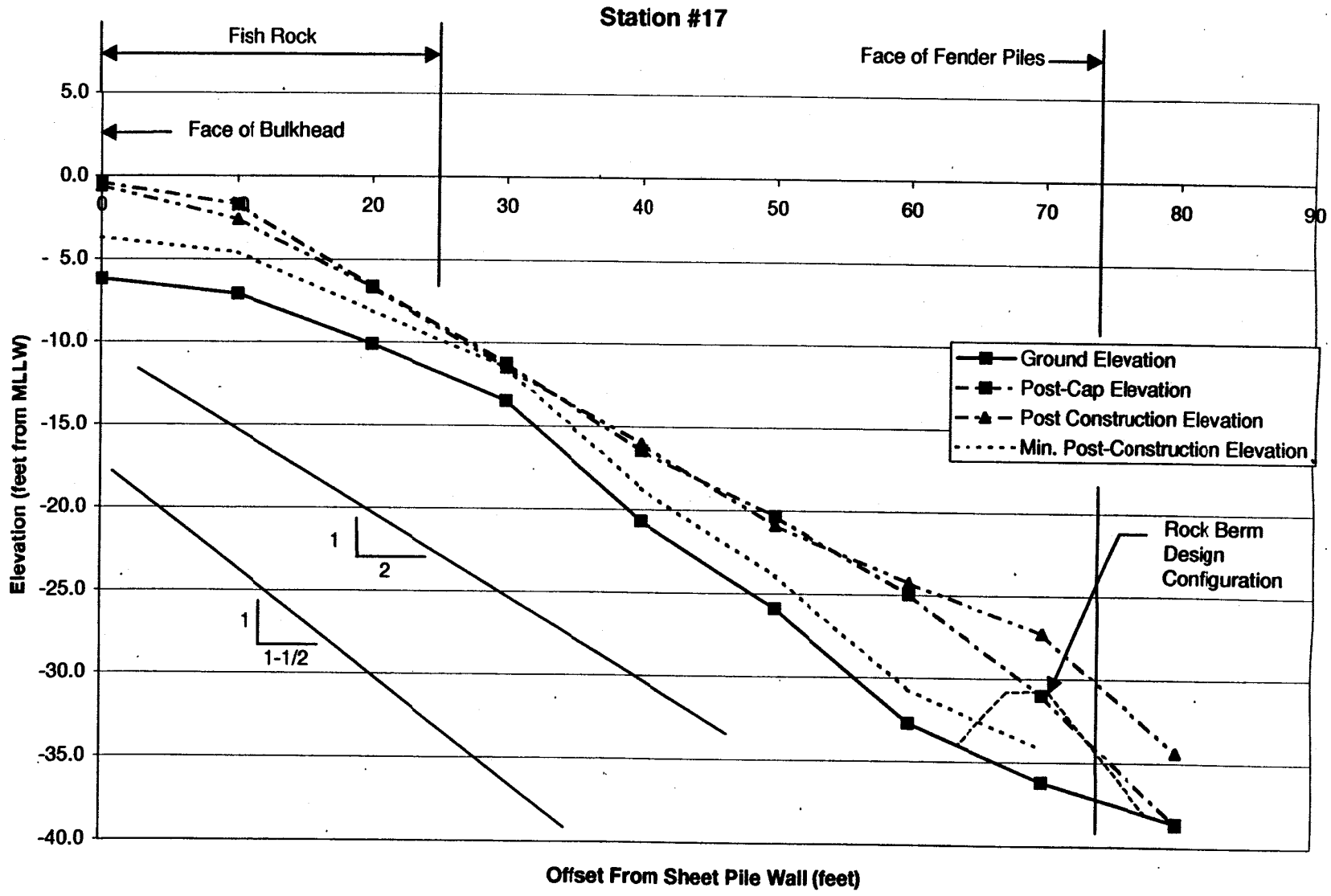

Station #12
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm Design Configuration
1
2
1
1-1/2

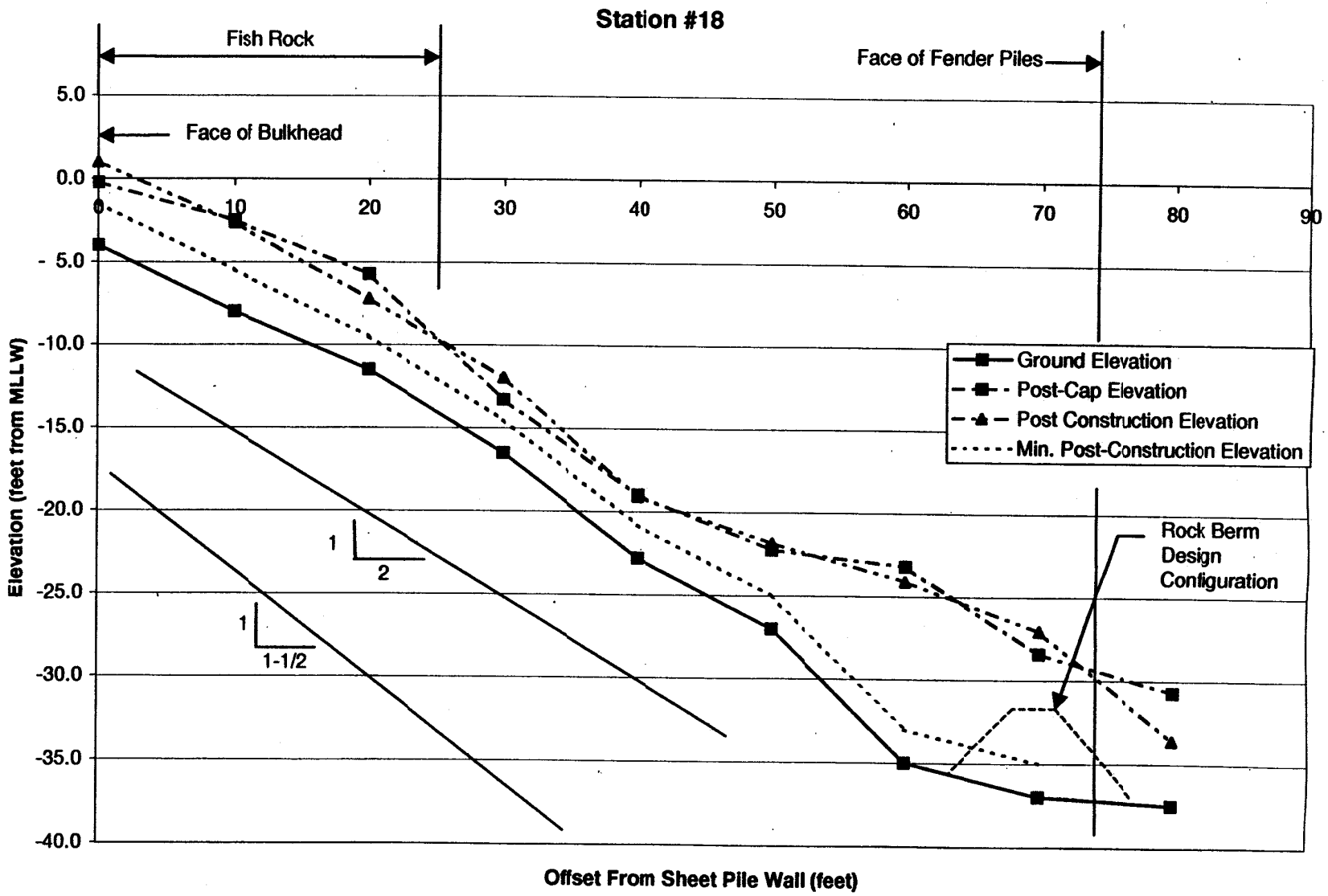

Station #13
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm
Design
Configuration
1
2
1
1-1/2

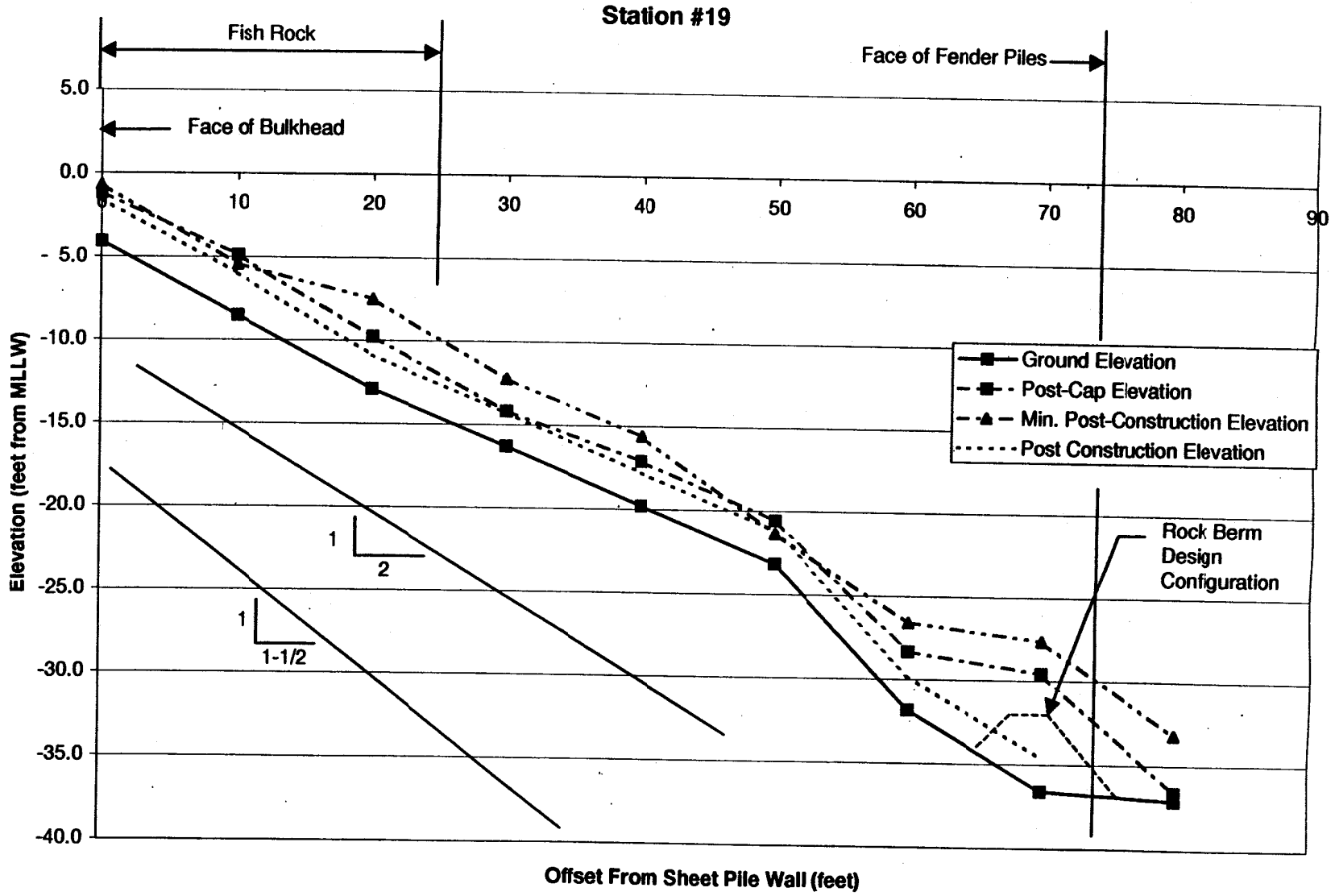

Station #14
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm
Design
Configuration
1
2
1
1-1/2


Station #15
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm
Design
Configuration
1
2
1
1-1/2


Station #16
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm Design Configuration
1
2
1
1-1/2


Station #17
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm Design Configuration
1
2
1
1-1/2


Station #18
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Post Construction Elevation
Min. Post-Construction Elevation
Rock Berm Design Configuration
1
2
1
1-1/2


Station #19
Fish Rock
Face of Fender Piles
Face of Bulkhead
5.0
0.0
- 5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
-40.0
0
10
20
30
40
50
60
70
80
90
Elevation (feet from MLLW)
Offset From Sheet Pile Wall (feet)
Ground Elevation
Post-Cap Elevation
Min. Post-Construction Elevation
Post Construction Elevation
Rock Berm
Design
Configuration
1
2
1
1-1/2

APPENDIX G
SEDIMENT CAP VOLUME CALCULATIONS

VOLUME CALCULATIONS

AS-BUILT VOLUMES

STA. OFFSET	ELEV. DIFF. (FT.)	AREA (S.F.)
12.5 FT. BEG. SECTION VOLUME		4528.13
STATION #1		
0	4.80	43.31
10	3.86	38.44
20	3.83	36.06
30	3.39	27.19
40	2.05	34.31
50	4.81	62.94
60	7.78	73.06
70	6.84	63.69
80	5.90	
TOTAL AREA		379.00
VOLUME BETWEEN CROSS SECTIONAL AREAS		9056.25
STATION #2		
0	2.00	23.31
10	2.66	29.44
20	3.23	43.56
30	5.49	36.19
40	1.75	18.31
50	1.91	44.44
60	6.98	79.06
70	8.84	71.19
80	5.40	
TOTAL AREA		345.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		8481.25
STATION #3		
0	2.60	25.75
10	2.55	48.75
20	7.20	59.25
30	4.65	31.25
40	1.60	23.75
50	3.15	42.75
60	5.40	55.75
70	5.75	45.75
80	3.40	
TOTAL AREA		333.00
VOLUME BETWEEN CROSS SECTIONAL AREAS		8050.00

PLAN VOLUMES

STA. OFFSET	ELEV. DIFF. (FT.)	AREA (S.F.)
12.5 FT. BEG. SECTION VOLUME		1953.13
STATION #1		
0	2.50	25.00
10	2.50	22.50
20	2.00	20.00
30	2.00	20.00
40	2.00	20.00
50	2.00	20.00
60	2.00	
70		**TOE BERM AREA/60-80FT.**
80		57.50
TOTAL AREA		185.00
VOLUME BETWEEN CROSS SECTIONAL AREAS		3906.25
STATION #2		
0	2.50	25.00
10	2.50	22.50
20	2.00	20.00
30	2.00	20.00
40	2.00	20.00
50	2.00	20.00
60	2.00	
70		**TOE BERM AREA/60-80FT.**
80		57.50
TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50
STATION #3		
0	2.50	25.00
10	2.50	22.50
20	2.00	20.00
30	2.00	20.00
40	2.00	20.00
50	2.00	20.00
60	2.00	
70		**TOE BERM AREA/60-80FT.**
80		57.50
TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #4			STATION #4		
0	2.20	34.81	0	2.50	25.00
10	4.76	48.44	10	2.50	22.50
20	4.93	41.06	20	2.00	20.00
30	3.29	27.19	30	2.00	20.00
40	2.15	28.81	40	2.00	20.00
50	3.61	49.44	50	2.00	20.00
60	6.28	49.56	60	2.00	
70	3.64	31.69	70		TOE BERM AREA/60-80FT.
80	2.70		80		57.50
TOTAL AREA		311.00	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		7812.50	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #5			STATION #5		
0	4.40	44.31	0	2.50	25.00
10	4.46	50.44	10	2.50	22.50
20	5.63	45.06	20	2.00	20.00
30	3.39	30.19	30	2.00	20.00
40	2.65	33.81	40	2.00	20.00
50	4.11	37.94	50	2.00	20.00
60	3.48	40.06	60	2.00	
70	4.54	32.19	70		TOE BERM AREA/60-80FT.
80	1.90		80		57.50
TOTAL AREA		314.00	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		8068.75	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #6			STATION #6		
0	2.80	36.81	0	2.50	25.00
10	4.56	55.94	10	2.50	22.50
20	6.63	61.06	20	2.00	20.00
30	5.59	38.19	30	2.00	20.00
40	2.05	25.31	40	2.00	20.00
50	3.01	40.44	50	2.00	20.00
60	5.08	46.56	60	2.00	
70	4.24	27.19	70		TOE BERM AREA/60-80FT.
80	1.20		80		57.50
TOTAL AREA		331.50	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		7356.25	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #7			STATION #7		
0	2.50	33.25	0	2.50	25.00
10	4.15	48.75	10	2.50	22.50
20	5.60	47.75	20	2.00	20.00
30	3.95	27.25	30	2.00	20.00
40	1.50	20.25	40	2.00	20.00
50	2.55	20.25	50	2.00	20.00
60	1.50	29.25	60	2.00	
70	4.35	30.25	70		TOE BERM AREA/60-80FT.
80	1.70		80		57.50
TOTAL AREA		257.00	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		6737.50	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #8			STATION #8		
0	4.20	39.31	0	2.50	25.00
10	3.66	44.94	10	2.50	22.50
20	5.33	46.56	20	2.00	20.00
30	3.99	38.69	30	2.00	20.00
40	3.75	38.31	40	2.00	20.00
50	3.91	32.44	50	2.00	20.00
60	2.58	24.06	60	2.00	
70	2.24	17.69	70		TOE BERM AREA/60-80FT.
80	1.30		80		57.50
TOTAL AREA		282.00	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		7431.25	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #9			STATION #9		
0	3.30	32.06	0	2.50	25.00
10	3.11	41.19	10	2.50	22.50
20	5.13	49.81	20	2.00	20.00
30	4.84	40.44	30	2.00	20.00
40	3.25	32.56	40	2.00	20.00
50	3.26	54.19	50	2.00	20.00
60	7.58	49.31	60	2.00	
70	2.29	12.94	70		TOE BERM AREA/60-80FT.
80	0.30		80		57.50
TOTAL AREA		312.50	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		7700.00	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #10			STATION #10		
0	4.00	31.94	0	2.50	25.00
10	2.39	40.31	10	2.50	22.50
20	5.68	60.69	20	2.00	20.00
30	6.46	42.56	30	2.00	20.00
40	2.05	18.44	40	2.00	20.00
50	1.64	29.31	50	2.00	20.00
60	4.23	46.69	60	2.00	
70	5.11	33.56	70		TOE BERM AREA/60-80FT.
80	1.60		80		57.50
TOTAL AREA		303.50	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		7606.25	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #11			STATION #11		
0	2.90	26.00	0	2.50	25.00
10	2.30	47.00	10	2.50	22.50
20	7.10	55.50	20	2.00	20.00
30	4.00	34.00	30	2.00	20.00
40	2.80	35.00	40	2.00	20.00
50	4.20	30.00	50	2.00	20.00
60	1.80	41.50	60	2.00	
70	6.50	36.00	70		TOE BERM AREA/60-80FT.
80	0.70		80		57.50
TOTAL AREA		305.00	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		8413.44	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #12			STATION #12		
0	3.00	47.69	0	2.50	25.00
10	6.54	64.56	10	2.50	22.50
20	6.38	48.94	20	2.00	20.00
30	3.41	27.81	30	2.00	20.00
40	2.15	25.21	40	2.00	20.00
50	2.89	52.60	50	2.00	20.00
60	7.63	64.96	60	2.00	
70	5.36	36.31	70		TOE BERM AREA/60-80FT.
80	1.90		80		57.50
TOTAL AREA		368.08	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		9032.19	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #13			STATION #13		
0	3.80	48.44	0	2.50	25.00
10	5.89	60.81	10	2.50	22.50
20	6.28	41.69	20	2.00	20.00
30	2.06	29.56	30	2.00	20.00
40	3.85	44.94	40	2.00	20.00
50	5.14	52.31	50	2.00	20.00
60	5.33	47.69	60	2.00	
70	4.21	29.06	70		TOE BERM AREA/60-80FT.
80	1.60		80		57.50
TOTAL AREA		354.50	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		9812.50	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #14			STATION #14		
0	4.40	44.69	0	2.50	25.00
10	4.54	60.06	10	2.50	22.50
20	7.48	61.44	20	2.00	20.00
30	4.81	40.31	30	2.00	20.00
40	3.25	37.69	40	2.00	20.00
50	4.29	48.56	50	2.00	20.00
60	5.43	71.44	60	2.00	
70	8.86	66.31	70		TOE BERM AREA/60-80FT.
80	4.40		80		57.50
TOTAL AREA		430.50	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		8756.25	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #15			STATION #15		
0	3.60	41.13	0	2.50	25.00
10	4.63	42.88	10	2.50	22.50
20	3.95	29.63	20	2.00	20.00
30	1.98	27.88	30	2.00	20.00
40	3.60	36.13	40	2.00	20.00
50	3.63	25.88	50	2.00	20.00
60	1.55	33.63	60	2.00	
70	5.18	32.88	70		TOE BERM AREA/60-80FT.
80	1.40		80		57.50
TOTAL AREA		270.00	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		7468.75	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50

STATION #16			STATION #16		
0	6.20	61.56	0	2.50	25.00
10	6.11	53.19	10	2.50	22.50
20	4.53	47.31	20	2.00	20.00
30	4.94	43.94	30	2.00	20.00
40	3.85	33.06	40	2.00	20.00
50	2.76	26.19	50	2.00	20.00
60	2.48	34.81	60	2.00	
70	4.49	27.44	70		TOE BERM AREA/60-80FT.
80	1.00		80		57.50
TOTAL AREA		327.50	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		9318.75	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50
STATION #17			STATION #17		
0	5.60	50.50	0	2.50	25.00
10	4.50	39.50	10	2.50	22.50
20	3.40	27.00	20	2.00	20.00
30	2.00	33.50	30	2.00	20.00
40	4.70	48.50	40	2.00	20.00
50	5.00	67.00	50	2.00	20.00
60	8.40	86.50	60	2.00	
70	8.90	65.50	70		TOE BERM AREA/60-80FT.
80	4.20		80		57.50
TOTAL AREA		418.00	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		11268.75	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50
STATION #18			STATION #18		
0	5.00	51.75	0	2.50	25.00
10	5.35	48.25	10	2.50	22.50
20	4.30	44.25	20	2.00	20.00
30	4.55	41.25	30	2.00	20.00
40	3.70	44.25	40	2.00	20.00
50	5.15	80.25	50	2.00	20.00
60	10.90	104.25	60	2.00	
70	9.95	69.25	70		TOE BERM AREA/60-80FT.
80	3.90		80		57.50
TOTAL AREA		483.50	TOTAL AREA		127.50
VOLUME BETWEEN CROSS SECTIONAL AREAS		10587.50	VOLUME BETWEEN CROSS SECTIONAL AREAS		3187.50
STATION #19			STATION #19		
0	3.40	32.25	0	2.50	25.00
10	3.05	42.25	10	2.50	22.50
20	5.40	47.25	20	2.00	20.00
30	4.05	41.25	30	2.00	20.00
40	4.20	30.25	40	2.00	20.00
50	1.85	35.25	50	2.00	20.00
60	5.20	70.75	60	2.00	
70	8.95	64.25	70		TOE BERM AREA/60-80FT.
80	3.90		80		57.50
TOTAL AREA		363.50	TOTAL AREA		127.50
12.5 FT. END SECTION VOLUME		5293.75	12.5 FT. END SECTION VOLUME		1593.75
TOTAL VOLUME CUBIC FEET		162780.00	TOTAL VOLUME CUBIC FEET		61640.63